



public works & infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

PROCUREMENT DOCUMENTS

FOR THE

DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE

BL25/015 WELKOM: THABONG: SAPS TRAINING COLLEGE

**INSTALLATION AND CONNECTION TO A BACKUP GENERATOR,
PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND
COMPLETE REPAIR OF ROOF STRUCTURE**

VOLUME TWO OF THREE: RETURNABLE DOCUMENTS

THE REGIONAL MANAGER
DEPARTMENT OF PUBLIC WORKS and INFRASTRUCTURE
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REF: 14/2/1/4/12/6835/1

SEPTEMBER 2025

NAME OF TENDERER: _____

CIDB NO.: _____

CSD NO.: _____

VOLUME 2: RETURNABLE DOCUMENTS

T2.1 LIST OF RETURNABLE DOCUMENTS

INDEX

DEPARTMENT PUBLIC WORKS AND INFRASTRUCTURE AT WELKOM: THABONG SAPS TRAINING COLLEGE FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE		
VOLUME 2: RETURNABLE DOCUMENTS	PAGE NO	DOCUMENT
T2.1 List of Returnable Documents		Separation sheet
List of Returnable Documents	1 to 3	PA-09 (EC)
C1.1 Form of Offer and Acceptance		Separation sheet
Form of Offer and Acceptance	1 to 4	DPW07
Declaration of Designated Groups For Preferential Procurement	1 to 2	PA-40
T2.2 Returnable Documents required for tender evaluation purposes		Separation sheet
Bills of Quantities	1 to 274	All trades to final summary
Declaration of Interest and Tenderer's Pas Supply Chain Management Practices	1 to 3	PA11 (EC)
Certification of Independent Bid Determination	1 to 4	PA-29
Resolution of Board of Directors	1 to 2	PA-15.1
Resolution of Board of Directors to enter into Consortia or Joint Ventures	1 to 2	PA-15.2
Special Resolution of Consortia or Joint Ventures	1 to 3	PA-15.3
Site Inspection Meeting Certificate	1 to 1	DPW16 (EC)
Preference Point Claim Form in terms of the preferential procurement regulations 2011	1 to 7	PA 16 (EC)
Particulars of Tenderer's Projects	1 to 2	DPW-09 (EC)
T2.2 Returnable Documents that will be incorporated into the contract		Separation sheet
Record of Addenda to tender documents	1 to 1	DPW-21 (EC)
Schedule of Proposed Subcontractors	1 to 1	DPW-15 (EC)
Particulars of Electrical Contractor	1 to 1	DPW-22 (EC)
Electrical/Security Work material and equipment schedules		Included in Volume 3
Schedule of Imported Materials and Equipment to be completed by Tenderer	1 to 1	DPW-23 (EC)

PA-09 (EC): LIST OF RETURNABLE DOCUMENTS

Project title:	WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE		
Tender / Quote no:	BL25/015	Reference no:	14/2/1/4/12/6835/1
Receipt Number:			

1. RETURNABLE DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

Note: Failure to submit the applicable documents will result in the tender offer being disqualified from further consideration.

Tender document name	Number of pages issued	Returnable document
Form of Offer and Acceptance (DPW-07 EC)	4 Pages	Yes
Declaration of Interest and Tenderer's Past Supply Chain Management Practices (PA-11)	4 Pages	Yes
Resolution of Board of Directors (PA-15.1) (if applicable)	1 Page	Yes
Resolution of Board of Directors to enter into Consortia or JV's (PA-15.2) (if applicable)	2 Pages	Yes
Special Resolution of Consortia or JV's (PA-15.3) (if applicable)	3 Pages	Yes
Preference points claim form in terms of the Preferential Procurement Regulations 2017 (PA – 16)	5 Pages	Yes
Certificate of independent Bid Determination (PA - 29)	4 Pages	Yes
Declaration Certificate for Local Production and Content for designated sectors (PA – 36 and Annexure/s C)	N/A	Yes
Fully completed Declaration of Designated Groups for Preferential Procurement (PA 40)	2 Pages	Yes
Registration on National Treasury's Central Supplier Database (CSD).	-	Yes
Particulars of Tenderer's Projects (DPW-09 EC)	2 Pages	Yes
Site Inspection Meeting Certificate (DPW-16 EC) (if applicable).	1 Page	Yes
Record of attending compulsory virtual bid clarification / site inspection meeting (if applicable).	1 Page	No
Record of Addenda to tender documents (DPW-21 EC)	1 Page	Yes
Site Inspection Meeting Certificate (DPW-16 EC) (if applicable)	1 Page	No
Proof of 30% Subcontracting participation and related documents in terms of the Preferential Procurement Regulations 2017 (if applicable).		No
EPWP Declaration	1 Page	Yes

* In compliance with the requirements of the CIDB SFU Annexure G

Tender no: **BL25/015**

2. ADDITIONAL RETURNABLE DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

Note: Failure to submit the applicable documents will result in the Tenderer having to submit same upon request within a stipulated time and if not complied with, will result in the tender offer being disqualified from further consideration. [See also C.2.18 of the Standard Conditions of Tender]

Tender document name	Number of pages issued	Returnable document
Any <u>additional</u> information required to complete a risk assessment (<i>if applicable</i>)	-	Yes
Company Organogram with Site Management Personnel	TBD	Yes
Project Execution Plan	TBD	No
CV and Pr Certificate For CHSO	TBD	

3. RETURNABLE DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT

Note: Failure to submit the applicable documents will result in the Tenderer having to submit same upon request within a stipulated time and if not complied with, will result in the tender offer being disqualified from further consideration. [See also C.2.18 of the Standard Conditions of Tender]

Tender document name	Number of pages issued	Returnable document
Schedule of proposed sub-contractors (DPW-15 EC) (<i>if applicable</i>)	1 Page	Yes
Particulars of Electrical Contractor (DPW-22 EC) (<i>if applicable</i>)	1 Page	Yes
Mechanical / Electrical / Security Work material and equipment schedules (<i>if applicable</i>)	Pages	Yes
Schedule for Imported Materials and Equipment (DPW-23 EC) (<i>if applicable</i>)	1 Page	Yes

4. OTHER DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT

(Insert a tick in the "Returnable document" column to indicate which documents must be returned with the tender)

Note: Failure to submit the applicable documents will result in the tender offer being disqualified from further consideration.

Tender document name	Number of pages issued	Returnable document
Priced Bills of Quantities / Lump Sum Document (complete document inclusive of all parts)	As per BOQ Pages	<input type="checkbox"/> Yes <input type="checkbox"/> No
Fully priced and completed sectional summary- and final summary pages with the tender.	1 Pages	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Pages	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Pages	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Pages	<input type="checkbox"/> Yes <input type="checkbox"/> No

Tender no: **BL25/015**

5. ADDITIONAL INFORMATION THAT MAY BE REQUIRED FOR TENDER EVALUATION PURPOSES

Legal Status of Tendering Entity: If the Tendering Entity is:	Documentation to be submitted with the tender, or which may be required during the tender evaluation:
a. A close corporation, incorporated prior to 1 May 2011 under the Close Corporations Act, 1984 (Act 69 of 1984, as amended)	Copies of the Founding Statement – CK1
b. A profit company duly registered as a private company. [including a profit company that meets the criteria for a private company, whose Memorandum of Incorporation states that the company is a personal liability company in terms of Section 8(2)(c) of the Companies Act, 2008 (Act 71 of 2008, as amended)].	Copies of: i. Certificate of Incorporation – CM1; ii. Shareholding Certificates of all Shareholders of the company, plus a signed statement of the company's Auditor, certifying each Shareholder's ownership / shareholding percentage relative to the total; and/or iii. Memorandum of Incorporation in the case of a personal liability company.
c. A profit company duly registered as a private company in which any, or all, shares are held by one or more other close corporation(s) or company(ies) duly registered as profit or non-profit company(ies).	Copies of documents referred to in a. and/or b. above in respect of all such close corporation(s) and/or company(ies).
d. A profit company duly registered as a public company.	Copy of Certificate of Incorporation – CM1, and a signed statement of the company's Secretary or Auditor confirming that the company is a public company.
e. A non-profit company, incorporated in terms of Section 10 and Schedule 1 of the Companies Act, 2008 (Act 71 of 2008, as amended).	Copies of: i the Founding Statement – CK1; and ii the Memorandum of Incorporation setting out the object of the company, indicating the public benefit, cultural or social activity, or communal or group interest.
f. A natural person, sole proprietor or a Partnership	Copy(ies) of the Identity Document(s) of: i. such natural person/ sole proprietor, or each of the Partners to the Partnership.
g. A Trust	Deed of Trust duly indicating names of the Trustee(s) and Beneficiary (ies) as well as the purpose of the Trust and the mandate of the Trustees.

Signed by the Tenderer:

Name of representative	Signature	Date

C1.1 FORM OF OFFER AND ACCEPTANCE

DPW-07 (EC): FORM OF OFFER AND ACCEPTANCE

Project title:	WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE		
Tender no:	BL25/015	Reference no:	14/2/1/4/12/6835/1

OFFER

The Employer, identified in the acceptance signature block, has solicited offers to enter into a contract for the procurement of:

WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE

The Tenderer, identified in the offer signature block, has examined the documents listed in the tender data and addenda thereto as listed in the returnable schedules, and by submitting this offer has accepted the conditions of tender.

By the representative of the Tenderer, deemed to be duly authorized, signing this part of this form of offer and acceptance, the Tenderer offers to perform all of the obligations and liabilities of the Contractor under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the conditions of contract identified in the contract data.

THE TOTAL OFFER INCLUSIVE OF ALL APPLICABLE TAXES ("All applicable taxes" includes value-added tax, pay as you earn, income tax, unemployment insurance fund contributions and skills development levies) **IS:**

Rand (in figures) R

Rand (in words).....

.....

.....

The amount in words takes precedence over the amount in figures. The award of the tender may be subjected to further price negotiation with the preferred tenderer(s). The negotiated and agreed price will be considered for acceptance as **a firm and final offer**.

This offer may be accepted by the Employer by signing the acceptance part of this form of offer and acceptance and returning one copy of this document to the Tenderer before the end of the period of validity stated in the tender data, whereupon the Tenderer becomes the party named as the Contractor in the conditions of contract identified in the contract data.

THIS OFFER IS MADE BY THE FOLLOWING LEGAL ENTITY: (cross out block which is not applicable)

Company or Close Corporation:

.....

.....

And: Whose Registration Number is:

.....

And: Whose Income Tax Reference Number is:

.....

CSD supplier number:.....

OR

Natural Person or Partnership:

.....

.....

Whose Identity Number(s) is/are:

.....

Whose Income Tax Reference Number is/are:

.....

.....

CSD supplier number:.....

*Any reference to words "Bid" or "Bidder" herein and/or in any other documentation shall be construed to have the same meaning as the words "Tender" or "Tenderer".

**Any reference to the words "payment reduction" herein shall be construed to have the same meaning as the word "retention"

For Internal & External Use

Tender / Quotation no: BL25/015

AND WHO IS (if applicable):	
Trading under the name and style of:	
AND WHO IS:	
Represented herein, and who is duly authorised to do so, by: Mr/Mrs/Ms: In his/her capacity as:	Note: A Resolution / Power of Attorney, signed by all the Directors / Members / Partners of the Legal Entity must accompany this Offer, authorising the Representative to make this offer.

SIGNED FOR THE TENDERER:

Name of representative	Signature	Date

WITNESSED BY:

Name of witness	Signature	Date

This Offer is in respect of: (Please indicate with an "X" in the appropriate block)

- The official documents ☐
 The official alternative ☐
 Own alternative (only if documentation makes provision therefore) ☐

(N.B.: Separate Offer and Acceptance forms are to be completed for the main and for each alternative offer)

SECURITY OFFERED:

- (a) the Tenderer accepts that in respect of contracts up to R1 million, a payment reduction** of 5% of the contract value (excluding VAT) will be applicable and will be deducted by the Employer in terms of the applicable conditions of contract
- (b) in respect of contracts above R1 million, the Tenderer offers to provide security as indicated below:
- (1) cash deposit of 10 % of the Contract Sum (excluding VAT) Yes ☐ No ☐
 - (2) variable construction guarantee of 10 % of the Contract Sum (excluding VAT) Yes ☐ No ☐
 - (3) payment reduction of 10% of the value certified in the payment certificate (excluding VAT) Yes ☐ No ☐
 - (4) cash deposit of 5% of the Contract Sum (excluding VAT) and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT) Yes ☐ No ☐
 - (5) fixed construction guarantee of 5% of the Contract Sum (excluding VAT) and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT) Yes ☐ No ☐

NB. Guarantees submitted must be issued by either an insurance company duly registered in terms of the Insurance Act [Long-Term Insurance Act, 1998 (Act 52 of 1998) or Short-Term Insurance Act, 1998 (Act 35 of 1998)] or by a bank duly registered in terms of the Banks Act, 1990 (Act 94 of 1990) on the pro-forma referred to above. No alterations or amendments of the wording of the pro-forma will be accepted.

*Any reference to words "Bid" or "Bidder" herein and/or in any other documentation shall be construed to have the same meaning as the words "Tender" or "Tenderer".

**Any reference to the words "payment reduction" herein shall be construed to have the same meaning as the word "retention"

Tender / Quotation no: BL25/015

The Tenderer elects as its *domicilium citandi et executandi* in the Republic of South Africa, where any and all legal notices may be served, as (physical address):

Other Contact Details of the Tenderer are:

Telephone No..... Cellular Phone No.

Fax No

Postal address

Banker Branch.....

Registration No of Tenderer at Department of Labour

CIDB Registration Number:

ACCEPTANCE

By signing this part of this form of offer and acceptance, the Employer identified below accepts the Tenderer's offer. In consideration thereof, the Employer shall pay the Contractor the amount due in accordance with the conditions of contract identified in the contract data. Acceptance of the Tenderer's offer shall form an agreement between the Employer and the Tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract are contained in:

- Part C1 Agreement and contract data, (which includes this agreement)
- Part C2 Pricing data
- Part C3 Scope of work
- Part C4 Site information and drawings and documents or parts thereof, which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the tender data and any addenda thereto as listed in the tender schedules as well as any changes to the terms of the offer agreed by the Tenderer and the Employer during this process of offer and acceptance, are contained in the schedule of deviations attached to and forming part of this agreement. No amendments to or deviations from said documents are valid unless contained in this schedule.

The Tenderer shall within two weeks after receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the Employer's agent (whose details are given in the contract data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the contract data. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the schedule of deviations (if any). Unless the tenderer (now contractor) within five (5) working days of the date of such receipt notifies the employer in writing of any reason why he/she cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

For the Employer:

Name of signatory	Signature	Date

*Any reference to words "Bid" or "Bidder" herein and/or in any other documentation shall be construed to have the same meaning as the words "Tender" or "Tenderer".

**Any reference to the words "payment reduction" herein shall be construed to have the same meaning as the word "retention"

For Internal & External Use



Tender / Quotation no: BL25/015

Name of Organisation:	Department of Public Works and Infrastructure
Address of Organisation:	

WITNESSED BY:

Name of witness	Signature	Date

Schedule of Deviations

1.1.1. Subject:
Detail:
1.1.2. Subject:
Detail:
1.1.3. Subject:
Detail:
1.1.4. Subject:
Detail:
1.1.5. Subject:
Detail:
1.1.6. Subject:
Detail:

By the duly authorised representatives signing this agreement, the Employer and the Tenderer agree to and accept the foregoing schedule of deviations as the only deviations from and amendments to the documents listed in the tender data and addenda thereto as listed in the tender schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the Tenderer and the Employer during this process of offer and acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the Tenderer of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this agreement.

*Any reference to words "Bid" or "Bidder" herein and/or in any other documentation shall be construed to have the same meaning as the words "Tender" or "Tenderer".

**Any reference to the words "payment reduction" herein shall be construed to have the same meaning as the word "retention"

For Internal & External Use

C2.2 BILLS OF QUANTITIES

**PRELIMINARIES FOR INCLUSION IN
BILLS OF QUANTITIES BASED ON THE
JBCC DOCUMENTATION**

SECTION NO 1:
PRELIMINARIES



public works
& infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

**PRELIMINARIES
FOR INCLUSION IN
BILLS OF QUANTITIES AND
LUMP SUM DOCUMENTS
BASED ON THE
JBCC EDITION 6.2 - MAY 2018
DOCUMENTATION**

20 JULY 2022

NOTES TO CONSULTANT QUANTITY SURVEYORS / PROJECT MANAGERS

PRELIMINARIES

The attached pro-forma Preliminaries which are to be inserted in the Bills of Quantities / Lump Sum Document, are to be dealt with as follows:

Section A

Section A lists the clauses of and refers directly to the JBCC Principal Building Agreement (Edition 6.2 - May 2018), as well as those clauses that have been changed in Clause B18.0 of the Contract Data for Organs of State and other Public Sector Bodies

Section B

Section B lists the clauses of and refers directly to the JBCC General Preliminaries (May 2018)

Section C

Section C contains specific preliminary items. All items must be scrutinised and any item which is not appropriate must be marked N/A (Not Applicable)

Any new items which may be necessary for a particular service must be inserted at the end of Section C

SECTION 1**PRELIMINARIES****MEANING OF TERMS "TENDER / TENDERER"**

Any reference to the words "Tender" or "Tenderer" herein and/or in any other documentation shall be construed to have the same meaning as the words "Bid" or "Bidder"

BUILDING AGREEMENT AND PRELIMINARIES

The **JBCC** Principal Building Agreement (Edition 6.2 - May 2018) prepared by the Joint Building Contracts Committee shall be the applicable building agreement, amended as hereinafter described to be read in conjunction with the **Contract Data** issued with the tender.

The **JBCC** General Preliminaries (May 2018) published by the Joint Building Contracts Committee for use with the **JBCC** Principal Building Agreement (Edition 6.2 - May 2018) shall be deemed to be incorporated in these **bills of quantities** / lump sum document, amended as hereinafter described

The **contractor** is deemed to have referred to the abovementioned documents for the full intent and meaning of each clause

The clauses in the abovementioned documents are hereinafter referred to by clause number and heading only

Where any item is not relevant to this **agreement** such item is marked N/A signifying "not applicable"

Where standard clauses or alternatives are not entirely applicable to this **agreement** such amendments, modifications, corrections or supplements as will apply are given under each relevant clause heading and such amendments, modifications, corrections or supplements shall take precedence notwithstanding anything to the contrary contained in the abovementioned documents

TENDERER'S SELECTIONS

Before submission of his tender the **contractor** is to complete the tenderer's selections in the **contract data for organs of state and other public sector bodies**

STRUCTURE OF THIS PRELIMINARIES BILL

Section A : A recital of the headings of the individual clauses in the aforementioned **JBCC** Principal Building Agreement

Section B : A recital of the headings of the individual clauses in the aforementioned **JBCC** General Preliminaries

Section C : Any special clauses to meet the particular circumstances of the project

PRICING OF PRELIMINARIES

Should the **contractor** select Option A in the **contract data for organs of state and other public sector bodies** for the adjustment of **preliminaries**, the amounts entered against the relevant items in these **preliminaries** are to be divided into one or more of the three categories provided namely fixed (F), value related (V) and time related (T)

PRICING OF BILLS OF QUANTITIES

The **contractor** is to allow opposite each item for all costs in connection therewith. All prices to include, unless otherwise stated, for all materials, fabrication, conveyance and delivery, unloading, storing, unpacking, hoisting, labour, setting, fitting and fixing in position, cutting and waste (except where to be measured in accordance with the standard system of measurement), patterns, models and templates, plant, temporary works, returning of packaging, duties, taxes (other than Value Added Tax), imposts, establishment charges, overheads, profit and all other obligations arising out of this **agreement**.

Items left unpriced will be deemed to be covered in prices against other items throughout these **bills of quantities** and no claim for any extras arising out of the **contractor's** omission to price any item will be entertained

Prices for all **construction equipment**, temporary works, services and other items shall include for the supply, maintenance, operating cost and subsequent removal and making good as necessary

VALUE ADDED TAX

Provision is made in the summary page of these **bills of quantities** / lump sum document for the inclusion of Value Added Tax (VAT)

SECTION A: PRINCIPAL BUILDING AGREEMENT

INTERPRETATION

A1.0 DEFINITIONS AND INTERPRETATION

Clause 1.0

The following definitions replace corresponding definitions or are added to the definitions in the JBCC PRINCIPAL BUILDING AGREEMENT (Edition 6.2 of May 2018), whatever the case may be

ADVERSE WEATHER CONDITIONS: Adverse weather and inclement weather has the same meaning and used interchangeably and means any weather conditions i.e.: Rain, wind, snow, frost, temperature (cold or heat) that are not in the norm for the area where the construction takes place and during which no work is possible on site

AGREEMENT: The completed Form of Offer and Acceptance, the completed JBCC® Principal Building Agreement and contract data for organs of state and other public sector bodies, the contract drawings, the priced document and any other documents reduced to writing and signed by the authorised representative or representatives of the parties

CONSTRUCTION PERIOD: The period commencing on the date of possession of the **site** by the **contractor** and ending on the date of **practical completion**

CONTRACT PERIOD: The period commencing on the date of the letter of acceptance and ending on the date of final completion

COST FLUCTUATION shall mean contract price adjustment provision (CPAP) for the adjustment of fluctuation in the cost of labour, plant, material and goods as stated in the schedule

DEFAULT INTEREST: No Clause

GUARANTEE FOR CONSTRUCTION: A security in terms of the DPWI's Guarantee for Construction form/s, obtained by the contractor from an institution approved by the employer [CD]

INTEREST: The interest rates applicable on this contract, whether specifically indicated in the relevant clauses or not, will be the rate as determined by the Minister of Finance from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No 1 of 1999) as amended, calculated as simple interest, in respect of debts owing to the State, and will be the rate as published by the Minister of Justice and Correctional Services from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No 55 of 1975) as amended, calculated as simple interest, in respect of debts owing by the State

LETTER OF ACCEPTANCE: The letter of formal acceptance of the Contractor's or Service Provider's Tender / Bid, issued and signed by the Employer

PAYMENT CERTIFICATE: A certificate issued at regular agreed intervals [CD] by the principal agent to the parties certifying the amount due and payable in terms of Clause 25.3

PRINCIPAL AGENT: The person or entity appointed by the **employer** and named in the **contract data for organs of state and other public sector bodies**. In the event of a **principal agent** not being appointed, then all the duties and obligations of a **principal agent** as detailed in the **agreement** shall be fulfilled by the employer's representative as named in the **contract data for organs of state and other public sector bodies**

TARGETED SUBCONTRACTORS: Subcontractors that must be appointed to a total of 30% or more of the contract sum, by the contractor, projects with a contract sum of the amount determined by the Minister in terms of the latest Preferential Procurement regulations, as may be amended from time to time.

F:..... V:..... T:.....

Item

A2.0

LAW, REGULATIONS AND NOTICES

Clause 2.0

F:..... V:..... T:.....

Item

A3.0

OFFER AND ACCEPTANCE

Replace Clause 3.3 with the following:

This **agreement** shall come into force on the date of **letter of acceptance** and continue to be of force and effect until the end of the **latent defects liability period** [22.0] notwithstanding termination [29.0] or the certification of **final completion** [21.0] and final payment [25.0]

F:..... V:..... T:.....

Item

A4.0

CESSION AND ASSIGNMENT

Clause 4.0

Ref Clause 6.7 [CD] - Clause 4.2

Replace Clause 4.3 with the following:

Where a **contractor** cedes any right or any monies due to or to become due under this **agreement** as security in favour of a financial institution, the prior written consent of the **employer**, which consent shall not be unreasonably withheld, must be obtained

F:..... V:..... T:.....

Item

SECTION 1: PRELIMINARIES (SECTION A)

Each Item Carried to Collection

A5.0

DOCUMENTS

Clause 5.0

Replace last sentence of Clause 5.2 with the following:The original signed **agreement** shall be held by the **Employer****Replace Clause 5.4 with the following:**

The Bills of Quantities shall not be used as a specification of material and goods or methods unless so instructed by the Principal Agent. The contractor may not use the Bills of Quantities for purpose of ordering material. All dimensions and quantities must be determined on site before ordering. In the event of discrepancy between the drawings and Bills of Quantity, the drawings shall take preference

Replace Clause 5.5 with the following:

The parties may publish or disclose on any platform only the contract scope and contract amount

F:..... V:..... T:.....

Item

A6.0

EMPLOYER'S AGENTS

Clause 6.0

Replace Clause 6.5 with the following:

Where the principal agent and/or an agent fails to act or is unable to act or ceases to be the principal agent or an agent in terms of this agreement, the employer shall appoint another principal agent and/or an agent

Add the following as Clause 6.7:

In terms of the clauses listed hereunder, the employer has retained its authority and has not given a mandate to the principal agent, notwithstanding other provisions in the contract. The employer shall sign all documents in relation to clauses 4.2, 14.1.4, 14.4.1, 14.6, 15.1.4, 15.4.1, 23.1, 23.2, 23.3, 23.7, 23.8, 26.1, 26.7, 26.12

F:..... V:..... T:.....

Item

A7.0

DESIGN RESPONSIBILITY

Clause 7.0

Replace first sentence of Clause 7.2 with the following:

Any design responsibility undertaken by a subcontractor shall not devolve on the contractor except for items that require specific component design and or compatibility design and or shop drawings and or the assembly thereof

F:..... V:..... T:.....

Item

INSURANCES AND SECURITIES

A8.0

WORKS RISK

Clause 8.0

Replace Clause 8.4 with the following:

The **contractor** shall bear the full risk of damage to and/or destruction of the **works** by whatever cause during construction of the **works** and hereby indemnifies and holds harmless the **employer** against any such damage. The **contractor** shall take such precautions and security measures and other steps for the protection and security of the **works** as the **contractor** may deem necessary

SECTION 1: PRELIMINARIES (SECTION A)**Each Item Carried to Collection**

F:..... V:..... T:.....

Item

A9.0

INDEMNITIES

Clause 9.0

Add the following to the end of the first sentence of Clause 9.2.7:“.... due to no fault of the **contractor**

9.2.9 No Clause

9.2.10 No Clause

Add the following as clause 9.3:

The employer's rights to claim damages for the contractor's omissions and actions will not be affected.

F:..... V:..... T:.....

Item

A10.0

INSURANCES

Clause 10.0

Replace Clause 10.1 with the following:

The party responsible shall effect and keep the respective insurances [CD] in force, in favour of the employer as beneficiary , from the date of possession of the site until the issue of the certificate of practical completion and with an extension to cover the contractors obligations after the date of practical completion [8.2.2]

Add the following as Clause 10.1.5.1:**Hi Risk Insurance**

In the event of the project being executed in a geological area classified as a “High Risk Area”, that is an area which is subject to highly unstable sub-surface conditions that might result in catastrophic ground movement evident by sinkhole or doline formation the following will apply

Add the following as Clause 10.1.5.1.1 Damage to the works

The contractor shall, from the date of possession of the **site** until the date of the **certificate of practical completion**, bear the full risk of and hereby indemnifies and holds harmless the **employer** against any damage to and/or destruction of the **works** consequent upon a catastrophic ground movement as mentioned above. The **contractor** shall take such precautions and security measures and other steps for the protection of the **works** as he may deem necessary

When so instructed to do so by the **principal agent**, the **contractor** shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the **works** and to rebuild, restore, replace and/or repair the **works**, at the **contractor's** own costs

10.1.5.1.2 Injury to persons or loss of or damage to property

The **contractor** shall be liable for and hereby indemnifies and holds harmless the **employer** against any liability, loss, claim or proceeding arising at any time during the period of the contract whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of or caused by a catastrophic ground movement as mentioned above

The **contractor** shall be liable for and hereby indemnifies the **employer** against any and all liability, loss, claim or proceeding consequent upon loss of or damage to any moveable, or immovable property, or personal property, or property contiguous to the **site**, whether belonging to or under the control of the **employer** or any other body or person whomsoever arising out of or caused by a catastrophic ground movement, as mentioned above, which occurred during the period of the contract

10.1.5.1.3 Replace Clause with the following:

It is the responsibility of the **contractor** to ensure that he has adequate insurance to cover his risk and liability as mentioned in 10.1.5.1.1 and 10.1.5.1.2. Without limiting the **contractor's** obligations in terms of the contract, the **contractor** shall, within twenty-one (21) **calendar days of the date of letter of acceptance**, but before commencement of the **works**, submit to the **employer** proof of such insurance policy.

10.1.5.1.4 Replace Clause with the following:

The **employer** shall be entitled to recover any and all losses and/or damages of whatever nature suffered or incurred consequent upon the **contractor's** default of his obligations as set out in 10.1.5.1.1; 10.1.5.1.2 and 10.1.5.1.3. Such losses or damages may be recovered from the **contractor** or by deducting the same from any amounts still due under this contract or under any other contract presently or hereafter existing between the **employer** and the **contractor** and for this purpose all these contracts shall be considered one indivisible whole

10.2 Replace Clause with the following:

Where practical completion in sections is required [20.0], or where the works is for alterations and additions, the contractor shall effect and keep in force contract works insurance [10.1.1], supplementary insurance [10.1.2], public liability insurance [10.1.3] and where applicable, removal of lateral support insurance [10.1.4] and other insurances [10.1.5] in favour of the employer as beneficiary

10.6 No Clause

Add the following as Clause 10.11

In the event that an insurer dispute the amount of the claim to be paid to the employer, the contractor shall be liable to the employer for the difference between the claim (as determined by the employers QS appointed on the project) made by the employer and the amount that the insurer is willing to pay

F:..... V:..... T:.....

Item

A11.0

SECURITIES**Add the following as to the relevant related Clauses as follows:****Add the following to Clause 11.1:**

In respect of contracts with a contract sum up to R1 million, the security to be provided by the contractor to the employer will be a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT).

In respect of contracts with a contract sum above R1 million, the contractor shall have the right to select the security to be provided in terms of C 1.0 Securities, as stated in the schedule. Such security shall be provided to the employer within fifteen (15) working days from commencement date. Should the contractor fail to select the security to be provided or should the contractor fail to provide the employer with the selected security within fifteen (15) working days from commencement date, the security in terms of C 1.0 Option C shall be deemed to have been selected.

The payment reduction of the value certified in a payment certificate shall be mutatis mutandis in terms of 25.12.1 - 25.12.5

11.1.1 No Clause

11.1.2 No Clause

11.2.2 No Clause

11.3 No Clause

SECTION 1: PRELIMINARIES (SECTION A)

Each Item Carried to Collection

Replace Clause 11.4.1 with the following:

Hand over the site to the contractor and withhold an amount equal to ten per cent (10%) of each interim payment certificate until practical completion is achieved. The value certified shall be subject to the adjustments in terms of 25.12.6 to 25.12.10.

11.5 No Clause

11.6 No Clause

11.7 No Clause

11.8 No Clause

11.9 No Clause

11.10 No Clause

Add the following as Clause 11.11:

Where the security as a cash deposit of ten per cent (10%) of the contract sum (excluding VAT) has been selected:

Add the following as Clause 11.11.1:

The contractor shall furnish the employer with a cash deposit equal in value to ten percent (10%) of the contract sum (excluding VAT) within fifteen (15) working days from commencement date. Failure to furnish the employer with a cash deposit within fifteen (15) working days Clause 11.4 will apply mutatis mutandis.

Add the following as Clause 11.11.2:

The employer shall be entitled to recover expense and loss from the cash deposit in terms of Clause 27.0 provided that the employer notifies the Contractor in which event the employer's entitlement shall take precedence over his obligations to refund the cash deposit security or portions thereof to the contractor.

Add the following as Clause 11.11.3:

Within fifteen (15) working days of the date of practical completion of the works the employer shall reduce the cash deposit to an amount equal to three per cent (3%) of the contract value (excluding VAT) and refund the balance to the contractor

Add the following as Clause 11.11.4:

Within fifteen (15) working days of the date of final completion of the works the employer shall reduce the cash deposit to an amount equal to one per cent (1%) of the contract value (excluding VAT) and refund the balance to the contractor.

Add the following as Clause 11.11.5:

On the date of payment of the amount in the final payment certificate, the employer shall refund the remainder of the cash deposit to the contractor.

Add the following as Clause 11.11.6:

The parties expressly agree that neither the employer nor the contractor shall be entitled to cede the rights to the deposit to any third party.

Add the following as Clause 11.12:

Where security as a variable construction guarantee of ten percent (10%) of the contract sum (excluding VAT) has been selected:

Add the following as Clause 11.12.1:

The contractor shall furnish the employer with an acceptable variable construction guarantee equal in value to ten per cent (10%) of the contract sum (excluding VAT) within fifteen (15) working days after issuance of the letter of acceptance. Failure to submit an acceptable variable construction guarantee within fifteen (15) working days Clause 11.4 will apply mutatis mutandis.

Add the following as Clause 11.12.2:

The variable construction guarantee shall reduce and expire in terms of the Variable Construction Guarantee form included in the invitation to tender.

Add the following as Clause 11.12.3:

The employer shall return the variable construction guarantee to the contractor within fourteen (14) calendar days of it expiring.

Add the following as Clause 11.12.4:

Where the employer has a right of recovery against the contractor in terms of 27.0, the employer shall issue a written demand in terms of the variable construction guarantee.

Add the following as Clause 11.13:

Where security as a fixed construction guarantee of five per cent (5%) of the contract sum (excluding VAT) and a five per cent (5%) payment reduction of the value certified in the payment certificate (excluding VAT) has been selected:

Add the following as Clause 11.13.1:

The contractor shall furnish a fixed construction guarantee to the employer equal in value to five per cent (5%) of the contract sum (excluding VAT).

Add the following as Clause 11.13.2:

The fixed construction guarantee shall come into force on the date of issue and shall expire on the date of the last certificate of practical completion.

Add the following as Clause 11.13.3:

The employer shall return the fixed construction guarantee to the contractor within fourteen (14) calendar days of it expiring.

Add the following as Clause 11.13.4:

The payment reduction of the value certified in a payment certificate shall be mutatis mutandis in terms of 25.12.1 - 25.12.5.

Add the following as Clause 11.13.5:

Where the employer has a right of recovery against the contractor in terms of 27.0, the employer shall be entitled to issue a written demand in terms of the fixed construction guarantee or may recover from the payment reduction or from both.

Add the following as Clause 11.14.1:

Where security as a cash deposit of five per cent (5%) of the contract sum (excluding VAT) and a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT) has been selected:

Add the following as Clause 11.14.2:

The contractor shall furnish the employer with a cash deposit equal in value to five per cent (5%) of the contract sum (excluding VAT) within fifteen (15) working days from commencement date. Failure to submit a cash deposit within fifteen (15) working days Clause 11.4 will apply mutatis mutandis.

Add the following as Clause 11.14.3:

Within fifteen (15) working days of the date of practical completion of the works the employer shall refund the cash deposit in total to the contractor.

Add the following as Clause 11.14.4:

The payment reduction of the value certified in a payment certificate shall be mutatis mutandis in terms of 25.12.1 - 25.12.5.

Add the following as Clause 11.14.5:

Where the employer has a right of recovery against the contractor in terms of 27, the employer may recover from the payment reduction or cash deposit or from both.

Add the following as Clause 11.15:

Where security as a payment reduction of ten per cent (10%) of the value certified in the payment certificate (excluding VAT) has been selected.

Add the following as Clause 11.15.1:

The payment reduction of the value certified in a payment certificate shall be mutatis mutandis in terms of 25.12.6 to 25.12.10.

Add the following as Clause 11.15.2:

The employer shall be entitled to recover expense and loss from the cash deposit in terms of 27.0 provided that the employer notifies the Contractor in which event the employer's entitlement shall take precedence over his obligations to refund the cash deposit security or portions thereof to the contractor.

Add the following as Clause 11.16:

Payments made by the guarantor to the employer in terms of the fixed or variable construction guarantee shall not prejudice the rights of the employer or contractor in terms of this agreement.

Add the following as Clause 11.17:

Should the contractor fail to furnish the security in terms of 11.2 the employer, in his sole discretion, and without notification to the contractor, is entitled to change the contractor's selected form of security to that of a ten per cent (10%) payment reduction of the value certified in the payment certificate (excluding VAT).

F:..... V:..... T:.....

Item

EXECUTION

A12.0

OBLIGATIONS OF THE PARTIES**Clause 12.0****12.1.1 No Clause****Replace Clause 12.1.5 with the following:**

Give possession of the site to the contractor within ten (10) working days after approval of the Health and Safety Plan or the issue of a construction permit by the Department of Labour, if applicable, after the contractor complied with the terms of 12.2.22

12.1.6 No Clause**12.1.8 No Clause****Replace Clause 12.2.2 with the following:**

The priced Bills must be submitted to the Employer within fourteen (14) calendar days from date of request. Where the priced document contains errors or discrepancies and/or prices considered by the employer or principal agent to be imbalanced or unreasonable the employer or principal agent and the contractor shall adjust such prices without any change to the contract sum

Replace Clause 12.2.5 with the following :

Effect and keep in force insurances in favour of the employer as beneficiary where the contractor is responsible for providing insurances [10.0] [CD]

Replace Clause 12.2.13 with the following:

Designate a competent person full time on site to continuously administer and control the works on site and to receive and implement notices and contract instructions on behalf of the contractor

Add the following as Clause 12.2.22:**SECTION 1: PRELIMINARIES (SECTION A)**

Each Item Carried to Collection

Within fourteen (14) working days of the date of the letter of acceptance submit to the principal agent an acceptable health and safety plan, required in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993)

Add the following as Clause 12.2.23:

The contractor shall within reasonable time inform the agents regarding inspection of the works before covering / closing [B 12.0]

Offices

The **contractor** shall provide, maintain and remove on completion of the **works** an office for the exclusive use of the **principal agent**, minimum size 4 x 3 x 3m high internally, suitably insulated and ventilated, provided with electric lighting and fitted with boarded floor, desk, chair, drawing stool, drawing board and lock-up drawers for drawings. The office shall be kept clean and fit for use at all times [12.2.18]

F:..... V:..... T:.....

Item

Main notice board

The **contractor** shall provide, erect where directed, maintain and remove on completion of the **works** a notice board size 3 x 3m as type Drawing GEN 063, constructed of suitable boarding with flat smooth surface and with edging bead 19mm thick round outer edges and projecting 12mm from face of boarding and rounded on front edge. The board shall be securely fixed to hoarding, where hoarding is provided, or fixed to and including a suitable supporting structure of timber or tubular posts and braces. The board is to be painted ivory white and the bead and 12mm wide dividing lines dark green. All wording shall be inscribed in dark green as per the coat of arms for SA. All wording shall be inscribed in dark green painted sans serif lettering [12.2.18]

F:..... V:..... T:.....

Item

A13.0 SETTING OUT

Clause 13.0

F:..... V:..... T:.....

Item

A14.0 NOMINATED SUBCONTRACTORS

Clause 14.0

Ref Clause 6.7 [CD] - Clause 14.1.4

14.1.5 No Clause

Replace "principal agent " with "employer" [6.7 [CD]] in Clause 14.4.1

Ref Clause 6.7 [CD] - Clause 14.6

F:..... V:..... T:.....

Item

A15.0 SELECTED SUBCONTRACTORS

Clause 15.0

Ref Clause 6.7 [CD] - Clause 15.1.4 & Clause 15.5

SECTION 1: PRELIMINARIES (SECTION A)

Each Item Carried to Collection

	15.1.5 No Clause			
	Replace Clause 15.1.2 with the following: The principal agent shall call for tenders from a list of tenderers agreed between the contractor and the employer			
	Replace "principal agent " with "employer" [6.7 [CD]] in Clause 15.4.1			
	F:..... V:..... T:.....	Item		
A16.0	DIRECT CONTRACTORS			
	Clause 16.0			
	F:..... V:..... T:.....	Item		
A17.0	CONTRACT INSTRUCTIONS			
	Clause 17.0			
	Replace Clause 17.4 with the following: The contractor shall comply with and duly execute all contract instructions except any contract instruction for additional work issued after the date of practical completion other than making good physical loss and repairing damage to the works in terms of 8.0 and 21			
	Add the following clause as Clause 17.6: Minutes of meetings shall not constitute a site instruction unless reduced to a written contract instruction issued by the principal agent in terms of this contract / agreement.			
	F:..... V:..... T:.....	Item		
	COMPLETION			
A18.0	INTERIM COMPLETION			
	Clause 18.0			
	F:..... V:..... T:.....	N/A	-	-
A19.0	PRACTICAL COMPLETION			
	Clause 19.0			
	Replace Clause 19.5 with the following: On issue of the only or last certificate of practical completion the employer shall be entitled to possession of the works and the site. On issue of the certificate of practical completion for a section, the employer shall be entitled to possession of such section			
	Add the following as Clause 19.8:			
	WORKS COMPLETION			
	(1) Within seven (7) calendar days of the date of practical completion the principal agent shall issue to the contractor a works completion list defining the outstanding work and defects apparent at the date of practical completion to be completed or rectified to achieve works completion.			
	(2) Where, in the opinion of the contractor, the works completion list has been completed the contractor shall notify the principal agent who shall inspect within seven (7) calendar days of receipt of such a notice. Where, in the opinion of the principal agent, the Works Completion list:			
	(2)(a) Has been satisfactorily completed, the principal agent shall forthwith issue a			

SECTION 1: PRELIMINARIES (SECTION A)**Each Item Carried to Collection**

certificate of Works Completion to the contractor with a copy to the employer

(2)(b) Has not been satisfactorily completed, the principal agent shall forthwith identify the works completion list items that are not yet complete and inform the contractor thereof. The contractor shall repeat the procedure in terms of 19.8(2)

(3) Should the principal agent not issue a works completion list, in terms of 19.8 (1) or 19.8 (2)(b), within seven (7) calendar days from the end of the inspection period, the contractor shall notify the employer and principal agent. Should the principal agent not issue such Works Completion list within seven (7) calendar days of receipt of such notice, the employer may within seven (7) calendar days issue to the contractor a Works Completion list. Should the employer:

(3)(a) Not issue such works completion list within seven (7) calendar days, then the certificate of Works Completion shall be deemed to have been issued on the date of expiry of the initial notice period and works completion shall be deemed to have been achieved on such date

(3b) Issue a works completion list and the work on Works Completion list not have been completed or where further defects have become apparent, the employer shall forthwith identify such items on the updated works completion list and notify the contractor. The contractor shall repeat the procedure in terms of 19.8(2)(b) until such items have been completed to the satisfaction of the employer

(4) Should the works completion list not be completed to the satisfaction of the employer within a period of twenty one (21) working days of the issue first works completion list the contractor shall be liable to a daily penalty as described in B12.0

(5) The defects liability period in terms of 21.1 shall commence with the issue or deemed issue of the certificate of Works Completion in terms of 19.8(2)(a) or 19.8(3).

F:..... V:..... T:.....

Item

A20.0

COMPLETION IN SECTIONS

Clause 20.0

Add the following as Clause 20.2.1.A

A certificate of Works Completion [19.8]

F:..... V:..... T:.....

Item

A21.0

DEFECTS LIABILITY PERIOD AND FINAL COMPLETION

Clause 21.0

Replace Clause 21.1 with the following:

The defects liability period for the works shall commence on the calendar day following the date of works completion and end at midnight (00:00) ninety (90) calendar days from the date of works completion [CD] or when work on the list for completion has been satisfactorily attended to [21.6], whichever is the later (if we use works completion)

Replace Clause 21.6 with the following:

On the expiry of the ninety (90) calendar days defects liability period [21.1] for items not indicated as items with an extended liability as indicated in B14 and on receipt of the contractor's notice to the principal agent

And/or

On the expiry of the defects liability period as indicated in B14, for items indicated in B14 and on receipt of the contractor's notice to the principal agent, the principal agent shall:

- (1) inspect the works And within ten (10) working days either issue a list for final completion detailing all outstanding work or defects that must be attended to, or rectified to achieve final completion or
- (2) issue the certificate of final completion to the contractor with a copy to the employer for that part of the works where defects liability period has expired

21.6.1 Omit Clause

21.6.2 Omit Clause

Add the following as Clause 21.13:

The ninety (90) calendar days defects liability period for the works [21.1] is replaced with an extended defects liability period of three hundred and sixty-five (365) calendar days in respect of the listed applicable elements in B14

Add the following as Clause 21.14:

Penalties will be applied if the items on the completion list have not been attended to within a period of ninety (90) calendar days [21.1]. If additional defect items have being added to the list during this period, then the Principal Agent and Contractor will agree on a revised completion date. Failing in achieving the revised date will result in penalties being applied.[B12.0]

F:..... V:..... T:.....

Item

A22.0

LATENT DEFECTS LIABILITY PERIOD

Clause 22.0

22.3.2 No Clause

F:..... V:..... T:.....

Item

A23.0

REVISION OF THE DATE FOR PRACTICAL COMPLETION

Clause 23.0

Ref Clause 6.7 [CD] – Clause 23.1

Ref Clause 6.7 [CD] – Clause 23.2

23.2.13 No Clause

Replace Clause 23.3 with the following:

Further circumstances that delays practical completion due to any other cause beyond the contractor's reasonable control that could not have reasonably been anticipated and provided for which the contractor may be entitled to a revision of the date for practical completion, with or without an adjustment of the contract value as determined by the Employer [6.7 CD]

Ref Clause 6.7 [CD] - Clause 23.7

Ref Clause 6.7 [CD] - Clause 23.8

F:..... V:..... T:.....

Item

A24.0

PENALTY FOR LATE OR NON-COMPLETION

Clause 24.0

Replace Clause 24.1 with the following:

Where the contractor fails to bring the works, or a section thereof, to practical-, works-, or final-completion by the applicable completion date [CD], or the revised applicable completion date, the contractor shall be liable to the employer for the penalty [CD]

SECTION 1: PRELIMINARIES (SECTION A)

Each Item Carried to Collection

Replace Clause 24.2 with the following:

Where the employer elects to levy such penalty the employer, or the principal agent on instruction from the employer, shall give notice thereof to the contractor. The principal agent shall determine the penalty due from the later of the date for practical- works-, or final-completion [CD], or the revised date for practical- works-, or final- completion, up to and including the earlier of:

Replace Clause 24.2.1 with the following:

The actual or deemed date of practical- works-, or final- completion, of the works, or a section thereof [23.7.1]

F:..... V:..... T:.....

Item

PAYMENT

A25.0

PAYMENT

Clause 25.0

Replace Clause 25.2 with the following:

The principal agent shall issue at regular agreed intervals [CD] payment certificates, to the contractor with a copy to the employer, up to and including practical completion. Interim Payment certificates may be issued to the contractor between practical completion and the final payment certificate. A payment certificate may be for a nil or negative amount

Add the following to Clause 25.3:

25.3.12 Monthly Local content report,

25.3.13 EPWP / NYS payment register, labour reports and certified ID document of EPWP/ NYS beneficiaries, Contract between Contractor and EPWP/ NYS beneficiaries, attendance register. (if applicable)

25.3.14 Tax Invoice

25.3.15 Labour intensive report

25.3.16 Contract participation goal reports

25.5 No Clause

Replace Clause 25.6 with the following:

Materials and goods will only be certified and paid for upon providing proof of full payment to the supplier and proof of transfer of ownership from the supplier to the contractor by the contractor. Once paid, material and goods shall become the property of the employer and shall not be removed from site without the written authority of the Employer.

25.7.5 No clause.

Replace Clause 25.10 with the following:

The employer shall pay the contractor the amount stipulated in an issued payment certificate, correct in all material respects, within thirty (30) calendar days from the date of receiving the payment certificate, invoice and all other substantiating documentation for items certified in the payment certificate

Replace Clauses 25.12 to 25.12.3 with the following:

The value certified shall be subject to the following percentage adjustments :

(Clauses 25.12.1 to 25.12.5 shall be applicable to a contract sum up to R1 million. In the event of a contract sum more than R1 million for Options D & E (C 1.0 Securities [11.0]) Clauses 25.12.1 to 25.12.5 shall be applicable)

25.12.1 Where a security is selected in terms of C 1.0 Securities [11.0], the value of the works in terms of 25.1 and of the materials and goods in terms of 25.4 shall be certified in full. The value certified shall be subject to the following percentage adjustments:

25.12.2 Ninety-five per cent (95%) of such value in interim payment certificates issued up to the date of practical completion

25.12.3 Ninety-seven per cent (97%) of such value in interim payment certificates issued on the date of practical completion and up to but excluding the date of final completion

25.12.4 Ninety-nine per cent (99%) of such value in interim payment certificates issued on the date of final completion and up to but excluding the final payment certificate in terms of 26

25.12.5 One hundred per cent (100%) of such value in the final payment certificate in terms of 26 except where the amount certified is in favour of the employer. In such an event the payment reduction shall remain at the adjustment level applicable to the final payment certificate.

(Clauses 25.12.6 to 25.12.10 shall be applicable to a contract sum more than R1 million for Option C (C 1.0 Securities [11.0])

25.12.6 Where security is a payment reduction in term of C 1.0 Option C, value of the works in terms of 25.1 and materials and goods in terms of 25.4 shall be certified in full. The value certified shall be subject to the following percentage adjustments:

25.12.7 Ninety per cent (90%) of such value in interim payment certificates issued up to the date of practical completion

25.12.8 Ninety-seven per cent (97%) of such value in interim payment certificates issued on the date of practical completion and up to but excluding the date of final completion

25.12.9 Ninety-nine per cent (99%) of such value in interim payment certificates issued on the date of final completion and up to but excluding the final payment certificate in terms of 26

25.12.10 One hundred per cent (100%) of such value in the final payment certificate in terms of 26 except where the amount certified is in favour of the employer. In such an event the payment reduction shall remain at the adjustment level applicable to the final payment certificate

F:..... V:..... T:.....

Item

A26.0

ADJUSTMENT OF THE CONTRACT VALUE AND FINAL ACCOUNT

Clause 26.0

Ref Clause 6.7 [CD] – Clause 26.1

Omit Clause 26.4.3

Ref Clause 6.7 [CD] – Clause 26.7

Replace Clause 26.10 with the following:

The principal agent shall prepare the final account in consultation with the employer and issue the final account, to the contractor within sixty (60) working days of the date of practical completion

Ref Clause 6.7 [CD] – Clause 26.12

SECTION 1: PRELIMINARIES (SECTION A)

Each Item Carried to Collection

F:..... V:..... T:.....

Item

A27.0

RECOVERY OF EXPENSE AND/OR LOSS

Clause 27.0

Replace Clause 27.1.2 with the following:

Interest due to late payment only

Replace Clause 27.1.4 with the following:

Interest due to late payment only

27.1.5 No Clause

Replace Clause 27.5 with the following:

Where the employer decides to recover an amount due in terms of 27.2 from a construction guarantee, cash deposit or retention money held as security, the employer shall issue a written demand to the contractor before recovering the amount. Should such amount not be paid to the employer within fourteen (14) calendar days of the date-of notice by the employer, the employer may recover such an amount from the security.

Add the following as Clause 27.6:

Where a provisional sequestration or provisional liquidation order has been granted or where an order has been granted which commences sequestration, liquidation, bankruptcy, receivership, winding-up or any similar effect, against the contractor or this agreement is cancelled in terms of 29, the employer may issue a demand to the guarantor in terms of the construction guarantee or advance payment guarantee held as security.

F:..... V:..... T:.....

Item

SUSPENSION AND TERMINATION

A28.0

SUSPENSION BY THE CONTRACTOR

Clause 28.0

28 No Clause

28.1 No Clause

28.1.1 No Clause

28.1.2 No Clause

28.1.3 No Clause

28.1.4 No Clause

28.1.5 No Clause

28.2 No Clause

28.3 No Clause

28.4 No Clause

F:..... V:..... T:.....

Item

A29.0

TERMINATION

Clause 29.0

Add the following as Clause 29.1.4:

The contractor's estate has been sequestrated, liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa

SECTION 1: PRELIMINARIES (SECTION A)**Each Item Carried to Collection**

Add the following as Clause 29.1.5:

The contractor has engaged in corrupt or fraudulent practices in competing for or in executing the contract

Add the following as Clause 29.1.6:

Honour his obligations in terms of Clauses 10.1.5.1.3, 11.4.1 and 12.2. sub Clauses 5, 6, 8, 9, 10, 11, 12, 13, 15, 16, 19, 20, 22.

Replace Clause 29.7 with the following:

The employer, on notice to the contractor, may recover damages from the contractor from the date of termination including, but not limited to, additional costs incurred in the completion, consultant cost, rental of alternative accommodation, invitation of completion tenders, salaries of officials and safeguarding the site, of the remaining work [25.3.7; 27.1.3]

Replace Clause 29.9 with the following:

The employer has the right of recovery against the contractor, where applicable, [CD] from:

The guarantee for construction (variable) until the final payment has been made;

or

The guarantee for construction (fixed) until the date of practical completion;

or

The payment reduction until the final payment is made;

or

The cash deposit made as security until the final payment is made

29.14.1 No Clause

29.14.3 No Clause

29.14.4 No Clause

29.14.5 No Clause

29.14.6 No Clause

29.14.7 No Clause

29.15 No Clause

29.16 No Clause

29.17.3 No Clause

29.17.6 No Clause

29.21.5 No Clause

29.22 No Clause

29.23 No Clause

29.25.3 No Clause

29.25.4 No Clause

SECTION 1: PRELIMINARIES (SECTION A)

Each Item Carried to Collection

29.27 No Clause

F:..... V:..... T:.....

Item

DISPUTE RESOLUTION

A30.0

DISPUTE RESOLUTION

Clause 30.0

Replace Clause 30.2 with the following:

Where such disagreement is not resolved within ten (10) working days of receipt of such notice it shall be deemed to be a dispute and shall be submitted to Mediation as a first method of dispute resolution failing which the parties will resort to Litigation

30.3 to 30.7.7 No Clauses

Replace Clause 30.8 with the following:

The parties may, by agreement and at any time before Litigation, refer a dispute to mediation, in which event:

30.8.1 No Clause

Replace Clause 30.8.2 with the following:

The appointment of a mediator, the procedure, and the status of the outcome shall be agreed between the parties

Replace Clause 30.8.3 with the following:

Regardless of the outcome of a mediation the parties shall bear their own costs concerning the Mediation and equally share the costs of the mediator and related expenses

Replace Clause 30.9 with the following:

Institution of Litigation shall be commenced and process served within three (3) year from the date of existence of the dispute, failing which the dispute shall lapse

30.10 No Clause

30.12 No Clause

F:..... V:..... T:.....

Item

Item

R c

Item		R	c
	SECTION B: GENERAL PRELIMINARIES		
B1.0	DEFINITIONS AND INTERPRETATION		
B1.1	Definitions		
	F:..... V:..... T:.....	Item	
B1.2	Interpretation		
	F:..... V:..... T:.....	Item	
B2.0	DOCUMENTS		
B2.1	Checking of documents		
	F:..... V:..... T:.....	Item	
B2.2	Provisional bills of quantities		
	F:..... V:..... T:.....	Item	
B2.3	Availability of construction information		
	F:..... V:..... T:.....	Item	
B2.4	Ordering of materials and goods		
	F:..... V:..... T:.....	Item	
B3.0	PREVIOUS WORK AND ADJOINING PROPERTIES		
B3.1	Previous work - dimensional accuracy		
	F:..... V:..... T:.....	Item	
B3.2	Previous work - defects		
	F:..... V:..... T:.....	Item	
B3.3	Inspection of adjoining properties		
	F:..... V:..... T:.....	Item	
B4.0	THE SITE		
B4.1	Handover of site in stages		
	F:..... V:..... T:.....	Item	
B4.2	Enclosure of the works		
	F:..... V:..... T:.....	Item	
B4.3	Geotechnical and other investigations		
	F:..... V:..... T:.....	Item	
B4.4	Encroachments		
	F:..... V:..... T:.....	Item	

SECTION 1: PRELIMINARIES (SECTION B)

Each Item Carried to Collection

Item		R	c
B4.5	Existing premises occupied F:..... V:..... T:.....	Item	
B4.6	Services - known F:..... V:..... T:.....	Item	
B5.0	MANAGEMENT OF CONTRACT		
B5.1	Management of the works F:..... V:..... T:.....	Item	
B5.2	Progress meetings F:..... V:..... T:.....	Item	
B5.3	Technical meetings F:..... V:..... T:.....	Item	
B6.0	SAMPLES, SHOP DRAWINGS AND MANUFACTURER'S INSTRUCTIONS		
B6.1	Samples of materials F:..... V:..... T:.....	Item	
B6.2	Workmanship samples F:..... V:..... T:.....	Item	
B6.3	Shop drawings F:..... V:..... T:.....	Item	
B6.4	Compliance with manufacturer's instructions F:..... V:..... T:.....	Item	
B7.0	DEPOSITS AND FEES		
B7.1	Deposits and fees F:..... V:..... T:.....	Item	
B8.0	TEMPORARY SERVICES		
B8.1	Water F:..... V:..... T:.....	Item	
B8.2	Electricity F:..... V:..... T:.....	Item	
B8.3	Ablution and welfare facilities F:..... V:..... T:.....	Item	

SECTION 1: PRELIMINARIES (SECTION B)

Each Item Carried to Collection

Item		R	c
B8.4	Communication facilities		
	F:..... V:..... T:.....	Item	
B9.0	PRIME COST AMOUNTS		
B9.1	Responsibility for prime cost amounts		
	F:..... V:..... T:.....	Item	
B10.0	ATTENDANCE ON SUBCONTRACTORS		
B10.1	General attendance		
	The contractor shall at his own expense provide the following general attendance on the subcontractors :		
	Access to the site and places where the subcontract work is to be carried out, including the reasonable use of any temporary personnel hoists erected by the contractor		
	The provision of water and lighting and single phase electric power to a position within 50 metres of the place where the subcontract work is to be carried out but excluding water, fuel and power for commissioning of any installation		
	The provision of an area for the subcontractor to establish temporary office accommodation and workshops and for the storage of plant and materials		
	The use of erected scaffolding belonging to the contractor , in common with others having the like right, while it remains erected on the site		
	The use, at reasonable times by arrangement of the contractor's erected hoisting equipment		
	F:..... V:..... T:.....	Item	
B10.2	Special attendance		
	F:..... V:..... T:.....	Item	
B11.0	GENERAL		
B11.1	Protection of the works		
	F:..... V:..... T:.....	Item	
B11.2	Protection/isolation of existing works and works occupied in sections		
	F:..... V:..... T:.....	Item	
B11.3	Security of the works		
	F:..... V:..... T:.....	Item	
B11.4	Notice before covering work		
	F:..... V:..... T:.....	Item	

SECTION 1: PRELIMINARIES (SECTION B)

Each Item Carried to Collection

Item		R	c
B11.5	Disturbance The contractor shall keep the site , structures, etc well watered during operations to prevent dust and shall provide and erect and remove on completion of the works all necessary temporary dust screens all to the satisfaction of the principal agent F:..... V:..... T:.....	Item	
B11.6	Environmental disturbance F:..... V:..... T:.....	Item	
B11.7	Works cleaning and clearing F:..... V:..... T:.....	Item	
B11.8	Vermin F:..... V:..... T:.....	Item	
B11.9	Overhand work F:..... V:..... T:.....	Item	
B11.10	Tenant installations F:..... V:..... T:.....	Item	
B11.11	Advertising F:..... V:..... T:.....	Item	

SECTION C: SPECIFIC PRELIMINARIES

Section C contains specific preliminary items which apply to this contract except where N/A (Not Applicable) appears against an item

C1.0 CONTRACT DRAWINGS

* Select relevant paragraph and delete whichever is not applicable depending on whether the contract is based on a **bills of quantities** or lump sum document

* The drawings issued with the tender documents do not comprise the complete set but serve as a guide only for tendering purposes and for indicating the scope of the work to enable the tenderer to acquaint himself with the nature and extent of the **works** and the manner in which they are to be executed

* A full set of drawings is issued with the tender documents indicating the full scope of the work to enable the tenderer to acquaint himself with the nature and extent of the **works** and the manner in which they are to be executed

Should any part of the drawings not be clearly understood by the tenderer he shall, before submitting his tender, obtain clarification in writing from the **principal agent**

F:..... V:..... T:.....

Item

C2.0 PREAMBLES

The document "Construction Works: Specifications: General Specification (PW371-A) Edition 2.1" is obtainable on the Department's website (<http://www.publicworks.gov.za/> under "Consultants Guidelines"), and shall be read in conjunction with the **bills of quantities** / lump sum document and be referred to for the full descriptions of work to be done and materials to be used

The document "Construction Works: Specifications: Particular Specification (PW371-B) Edition 2.2" is issued together with the drawings and shall be read in conjunction with the drawings and the **bills of quantities** / lump sum document

F:..... V:..... T:.....

Item

C3.0 TRADE NAMES

Wherever a trade name for any product has been described in the **bills of quantities** / lump sum document, the tenderer's attention is drawn to the fact that any other product of equal quality may be used subject to the written approval of the **principal agent** being obtained prior to the closing date for submission of tenders

If prior written approval for an alternative product is not obtained, the product described shall be deemed to have been tendered for

F:..... V:..... T:.....

Item

C4.0 IMPORTED MATERIALS AND EQUIPMENT

Where imported items are listed in the tender documents, the tenderer shall provide all the information called for, failing which the price of any such item, materials or equipment shall be excluded from currency fluctuations. (refer to Schedule of Imported Materials and Equipment DPW-23(EC) to be completed by tenderer)

Notwithstanding any provisions elsewhere regarding the adjustment of contract prices, the

SECTION 1: PRELIMINARIES (SECTION C)
Collection

Each Item Carried to

price of any item, material or equipment listed in terms of this clause shall be excluded from the Contract Price Adjustment Provisions (if applicable)

F:..... V:..... T:.....

Item

C5.0 VIEWING THE SITE IN SECURITY AREAS

The **site** is situated in a security area and the tenderer must arrange with the unit commander or other responsible officer to obtain permission to enter the **site** for tendering purposes

F:..... V:..... T:.....

Item

C6.0 COMMENCEMENT OF WORKS IN SECURITY AREAS

As the **works** falls within a security area the **contractor** must give the unit commander or other responsible officer notice before commencement of the **works**. Should the **contractor** fail to make such arrangements, admission to the **site** may be refused and any additional costs will be for the **contractor's** account

F:..... V:..... T:.....

Item

C7.0 ENTRANCE PERMITS TO SECURITY AREAS

As the **works** falls within a security area the **contractor** shall obtain entrance permits for his personnel and workmen entering the area and shall comply with all regulations and instructions which may be issued from time to time regarding the protection of persons and property under the control of the Defence Force, Police or chief security officer

F:..... V:..... T:.....

Item

C8.0 SECURITY CHECK OF PERSONNEL

The **principal agent** may require the **contractor** to have his personnel and workmen, or a certain number of them, security classified

In the event of the **principal agent** requesting the removal of a person or persons from the **works** for security reasons, the **contractor** shall do so forthwith and shall thereafter ensure that such person or persons are denied access to the **works** and the **site** and/or to any document or information relating to the **works**

F:..... V:..... T:.....

Item

C9.0 PROHIBITION ON TAKING OF PHOTOGRAPHS

In terms of article 119 of the Defence Act, 44 of 1957, it is prohibited to sketch or to take photographs of any military site or installation or any building or civil works thereon or to be in possession of a camera or other apparatus used for taking of photographs except when authorized thereto by or on behalf of the Minister

The same prohibition is also applicable to all correctional institutions in terms of article 44.1(e) of the Correctional Services Act 8 of 1959

F:..... V:..... T:.....

Item

C10.0 HIV/AIDS AWARENESS

SECTION 1: PRELIMINARIES (SECTION C) Collection

Each Item Carried to

It is required of the **contractor** to thoroughly study the HIV/AIDS Specification (PW 1544) of the Department that must be read together with and is deemed to be incorporated under this Section of the **bills of quantities** / lump sum document. Provision for pricing of HIV/AIDS awareness is made under items C10.1 to C10.5 hereafter and it is explicitly pointed out that all requirements of the aforementioned specification are deemed to be priced hereunder, as the said items represent the only method of measurement and no additional items or extras to the contract in this regard shall be entertained

The **contractor** must take note that compliance with the HIV/AIDS Specification is compulsory. In the event of partial or total non-compliance, the **principal agent**, notwithstanding the provisions of Clause A 25.0 of Section A or any other clause to the contrary, reserves the right to delay issuing any progress **payment certificate** until the **contractor** provides satisfactory proof of compliance. The **contractor** shall not be entitled to any compensation of whatsoever nature, including **interest**, due to such delay of payment

C10.1 AWARENESS CHAMPION

Selection, appointment, briefing and making available of an Awareness Champion including provision of all relevant services, all in accordance with the HIV/AIDS Specification

F:..... V:..... T:.....

Item

C10.2 AWARENESS WORKSHOPS

Selection and appointment of a competent Service Provider approved by the **principal agent**, provision of a Service Provider Workshop Plan and a suitable venue, conducting of awareness workshops by means of traditional and/or modern multi-media techniques, including follow-up courses, making available all tuition material and performing assessment procedures, all in accordance with the HIV/AIDS Specification

F:..... V:..... T:.....

Item

C10.3 POSTERS, BOOKLETS, VIDEOS, ETC.

Provision, displaying, maintaining and replacing when necessary of four plastic laminated posters, booklets and educational videos, etc. for the duration of the **construction period**, all in accordance with the HIV/AIDS Specification

F:..... V:..... T:.....

Item

C10.4 ACCESS TO CONDOMS

Provision and maintenance of condom dispensers fixed in position, including male and female condoms, replenishing male and female condoms on a daily basis as required for the duration of the **construction period**, all in accordance with the HIV/AIDS Specification

F:..... V:..... T:.....

Item

C10.5 MONITORING

Monitoring HIV/AIDS awareness of workers, providing the **principal agent** with access to information including making available all reports, thoroughly completed and reflecting the correct information, for the duration of the **construction period** and close out, all in accordance with the HIV/AIDS Specification

F:..... V:..... T:.....

Item

SECTION 1: PRELIMINARIES (SECTION C) Collection

Each Item Carried to

C11.0 OCCUPATIONAL HEALTH AND SAFETY ACT

The **contractor** shall comply with all the requirements as set out in the Construction Regulations, 2014 issued under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993)

It is required of the **contractor** to thoroughly study the Health and Safety Specification that must be read together with and is deemed to be incorporated under this Section of the **bills of quantities** / lump sum document

The **contractor** must take note that compliance with the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification is compulsory. In the event of partial or total non-compliance, the **principal agent**, notwithstanding the provisions of Clause A25.0 of Section A or any other clause to the contrary, reserves the right to delay issuing any progress **payment certificate** until the **contractor** provides satisfactory proof of compliance. The **contractor** shall not be entitled to any compensation of whatsoever nature, including **interest**, due to such delay of payment

Provision for pricing of the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification is made under this clause and it is explicitly pointed out that all requirements of the aforementioned are deemed to be priced hereunder and no additional claims in this regard shall be entertained (*Please refer to the individual items to be priced at the back of the Health and Safety Specification and to be carried over to this item*).

F:..... V:..... T:.....

Item

C12.0 EMPLOYMENT AND TRAINING OF YOUTH WORKERS ON THE EXPANDED PUBLIC WORKS PROGRAMME (EPWP) INFRASTRUCTURE PROJECTS: NATIONAL YOUTH SERVICE (NYS)

The **contractor** shall comply with all the requirements as set out in the "Additional Specification SL: Employment and Training of Youth Workers on the Expanded Public Works Programme (EPWP) Infrastructure Projects: National Youth Service (NYS)" as attached to these **bills of quantities** / lump sum document

The **contractor** shall identify a minimum number of youth workers from a priority list, and shall employ them at the statutory labour rates for a minimum period and train them, all as per the aforementioned specification and as elsewhere measured in these **bills of quantities** / lump sum document

The **contractor** shall liaise and co-ordinate with the **employer** and the EPWP Training Service Provider with regard to the priority list, the selection of youth workers, and the employment and training of the identified youth workers

The **contractor** shall avail the services of an adequately qualified foreman specifically for the EPWP-NYS youth workers, to act as their construction supervisor. The foreman will be responsible for continually monitoring the progress of the youth workers and for addressing questions and issues that may arise from the youth workers

Separate items which will be subject to remeasurement have been included elsewhere in these **bills of quantities** / lump sum document to cover the direct costs associated with the employment and training of the youth workers. Any additional requirements in respect of the aforementioned specification are deemed to be priced hereunder and no additional claims in this regard shall be entertained

F:..... V:..... T:.....

Item

C13.0 IMPLEMENTATION OF LABOUR-INTENSIVE INFRASTRUCTURE PROJECTS UNDER THE EXPANDED PUBLIC WORKS PROGRAMME (EPWP)

SECTION 1: PRELIMINARIES (SECTION C)
Collection

Each Item Carried to

The **contractor** shall comply with all the requirements of the "Code of Good Practice for Employment and Conditions of Work for Special Public Works Programmes" issued in terms of the "Basic Conditions of Employment Act, 1997 (Act No 75 of 1997)" and the related "Ministerial Determination", for the employment of locally employed temporary workers on a labour-intensive infrastructure project under the Expanded Public Works Programme (EPWP)

The **contractor** shall maintain daily records with regard to the workers employed and shall, on a monthly basis, submit a report to the **principal agent** in the prescribed format. Compulsory indicators such as the project budget, actual project expenditure, number of job opportunities created, demographic characteristics of workers employed, minimum daily wage rate, number of person-days of employment created and number of training person-days, shall be included in said report, all as defined in the "Guidelines for the Implementation of Labour-Intensive Infrastructure Projects under the Expanded Public Works Programme (EPWP)"

Provision for pricing of compliance with the aforementioned is made under this clause and it is explicitly pointed out that all requirements in respect of the aforementioned are deemed to be priced hereunder and no additional claims in this regard shall be entertained

F:..... V:..... T:.....

Item

**SECTION 1
PRELIMINARIES
COLLECTION**

Item		Page	AMOUNT	
			R	c
	SECTION A: PRINCIPAL BUILDING AGREEMENT			
	Interpretation			
A1.0	Definitions and interpretation	2		
A2.0	Law, regulations and notices	2		
A3.0	Offer and acceptance	2		
A4.0	Cession and assignment	2		
A5.0	Documents	2		
A6.0	Employer's agents	2		
A7.0	Design responsibility	3		
	Insurances and securities			
A8.0	Works risk	3		
A9.0	Indemnities	3		
A10.0	Insurances	3		
A11.0	Securities	3		
	Execution			
A12.0	Obligations of the parties	3		
A13.0	Setting out	4		
A14.0	Nominated subcontractors	4		
A15.0	Selected subcontractors	4		
A16.0	Direct contractors	4		
A17.0	Contract instructions	4		
	Completion			
A18.0	Interim completion	4	N/A	-
A19.0	Practical completion	4		
A20.0	Completion in sections	4		
A21.0	Defects liability period and final completion	4		
A22.0	Latent defects liability period	5		
A23.0	Revision of the date for practical completion	5		
A24.0	Penalty for late and non-completion	5		
	Payment			
A25.0	Payment	5		
A26.0	Adjustment of the contract value and final account	5		
A27.0	Recovery of expense and/or loss	5		
		Carried forward R		

SECTION 1: PRELIMINARIES: COLLECTION

Effective date: 20 July 2022

Item		Brought forward R	R	c
	Suspension and termination			
A28.0	Suspension by the contractor	5		
A29.0	Termination	5		
	Dispute resolution			
A30.0	Dispute resolution	5		
	SECTION B: GENERAL PRELIMINARIES			
B1.0	Definitions and interpretation			
B1.1	Definitions	6		
B1.2	Interpretation	6		
B2.0	Documents			
B2.1	Checking of documents	6		
B2.2	Provisional bills of quantities	6		
B2.3	Availability of construction information	6		
B2.4	Ordering of materials and goods	6		
B3.0	Previous work and adjoining properties			
B3.1	Previous work - dimensional accuracy	6		
B3.2	Previous work - defects	6		
B3.3	Inspection of adjoining properties	6		
B4.0	The site			
B4.1	Handover of site in stages	6		
B4.2	Enclosure of the works	6		
B4.3	Geotechnical and other investigations	6		
B4.4	Encroachments	6		
B4.5	Existing premises occupied	7		
B4.6	Services - known	7		
B5.0	Management of contract			
B5.1	Management of the works	7		
B5.2	Progress meetings	7		
B5.3	Technical meetings	7		
B6.0	Samples, shop drawings and manufacturer's instructions			
B6.1	Samples of materials	7		
B6.2	Workmanship samples	7		
B6.3	Shop drawings	7		
B6.4	Compliance with manufacturer's instructions	7		

SECTION 1: PRELIMINARIES: COLLECTION

Effective date: 20 July 2022

Item			R c	
			Carried forward R	
			Brought forward R	
B7.0	Deposits and fees			
B7.1	Deposits and fees	7		
B8.0	Temporary services			
B8.1	Water	7		
B8.2	Electricity	7		
B8.3	Ablution and welfare facilities	7		
B8.4	Communication facilities	8		
B9.0	Prime cost amounts			
B9.1	Responsibility for prime cost amounts	8		
B10.0	Attendance on subcontractors			
B10.1	General attendance	8		
B10.2	Special attendance	8		
B11.0	General			
B11.1	Protection of the works	8		
B11.2	Protection/isolation of existing works and works occupied in sections	8		
B11.3	Security of the works	8		
B11.4	Notice before covering work	8		
B11.5	Disturbance	9		
B11.6	Environmental disturbance	9		
B11.7	Works cleaning and clearing	9		
B11.8	Vermin	9		
B11.9	Overhand work	9		
B11.10	Tenant installations	9		
B11.11	Advertising	9		
	SECTION C: SPECIFIC PRELIMINARIES			
C1.0	Contract drawings	10		
C2.0	Preambles	10		
C3.0	Trade names	10		
C4.0	Imported materials and equipment	10		
C5.0	Viewing the site in security areas	11		
C6.0	Commencement of works in security areas	11		
C7.0	Entrance permits to security areas	11		
C8.0	Security check of personnel	11		
C9.0	Prohibition on taking of photographs	11		

SECTION 1: PRELIMINARIES: COLLECTION

Effective date: 20 July 2022

Item			R	c
		Carried forward R		
		Brought forward R		
C10.0	HIV/AIDS awareness			
C10.1	Awareness champion	12		
C10.2	Awareness workshops	12		
C10.3	Posters, booklets, videos, etc	12		
C10.4	Access to condoms	12		
C10.5	Monitoring	12		
C11.0	Occupational Health and Safety Act	13		
C12.0	Employment and Training of Youth Workers on the Expanded Public Works Programme (EPWP) Infrastructure Projects: National Youth Service (NYS)	13		
C13.0	Implementation of Labour-Intensive Infrastructure Projects under the Expanded Public Works Programme (EPWP)	13		
SECTION 1 PRELIMINARIES				
CARRIED TO FINAL SUMMARY			R	

SUBTOTALS:	R	c
Category: Fixed R		
Category: Value R		
Category: Time R		

SECTION 1: PRELIMINARIES: COLLECTION

Effective date: 20 July 2022

SECTION NO 2:
BUILDING WORKS

Item No	Quantity	Rate	Amount
<p><u>SECTION 2</u></p> <p><u>BILL NO. 1</u></p> <p><u>ALTERATIONS</u></p> <p>For Preambles refer to "Specification of Materials and Methods to be used PW 371"</p> <p><u>(HAYLETT FORMULA WORK GROUP NO. 102)</u></p> <p><u>SUPPLEMENTARY PREAMBLES</u></p> <p><u>View site</u></p> <p>Before submitting his tender the contractor shall visit the site and satisfy himself as to the nature and extent of the work to be done and the value of the materials contained in the buildings or portions of the buildings to be demolished. No claim for any variations of the contract sum in respect of the nature and extent of the work or of inferior or damaged materials will be entertained</p> <p><u>Explosives</u></p> <p>No explosives whatsoever may be used for demolition purposes unless otherwise stated</p> <p><u>General</u></p> <p>The contractor shall carry out the whole of the works with as little mess and noise as possible and with a minimum of disturbance to adjoining premises and their tenants. He shall provide proper protection and provide, erect and remove when directed, any temporary tarpaulins that may be necessary during the progress of the works, all to the satisfaction of the principal agent</p> <p>Water supply pipes and other piping that may be encountered and found necessary to disconnect or cut, shall be effectually stopped off or grubbed up and removed, and any new connections that may be necessary shall be made with proper fittings, to the satisfaction of the principal agent</p>			
<p>Carried to Collection</p>			R
<p>Section: 2</p> <p>Bill No. 1</p> <p>ALTERATIONS</p> <p>BTKM QUANTITY SURVEYORS</p>			

Doors, fanlights, fittings, frames, linings, etc. which are to be re-used shall be thoroughly overhauled before refixing including taking off, easing and rehang, cramping up, re-wedging as required and making good cramps, dowels, etc, and easing, oiling, adjusting and repairing ironmongery as necessary, replacing any glass damaged in removal or subsequently and stopping up all nail and screw holes with tinted plastic wood to match timber, unless otherwise described. Re-painting or re-varnishing is given separately

Prices for taking out of doors, windows, etc shall include for removal of all beads, architraves, ironmongery, etc

Prices for taking out and removing doors and frames shall include for removing door stops, cabin hooks, etc and making good floor and wall finishes to match existing

With regard to building up of openings in existing walls, cement screeds and pavings, granolithic, tops of walls, etc, shall be levelled and prepared for raising of brickwork

Making good of finishes shall include making good of the brick and concrete surfaces onto which the new finishes are applied, where necessary

In all positions where screed is damaged, where existing walls, cupboards or existing vinyl floor finishes are removed: chop out any loose or cracked screed. Areas to be thoroughly cleaned and wire brushed. Float up, where required, to a smooth, true and even surface with 3:1 cement mortar of the required thickness but not less than 13mm, finishing perfectly level with existing screed. Fill surface imperfections with pavelite according to manufacturer's instructions.

The contractor will be required to take all dimensions affecting the existing buildings on the site and he will be held solely responsible for the accuracy of all such dimensions where used in the manufacture of new items (doors, windows, fittings, etc.)

THE CONTRACTOR/BIDDER MUST ALLOW IN HIS PRICES FOR SCAFFOLDING FOR THE FULL DURATION OF THE PROJECT, AS DOUBLE STOREY BUILDINGS ARE APPROXIMATELY 6M HIGH. NO ADDITIONAL CLAIMS IN THIS REGARD SHALL BE ENTERTAINED!

TEMPORARY BARRIERS, SCREENS, ETC

Carried to Collection

R

Section: 2
Bill No. 1
ALTERATIONS
BTKM QUANTITY SURVEYORS

Temporary barriers, screens, etc. including removal

- | | | | |
|---|---|---|----|
| 1 | Dust screen 2800mm high between concrete floor and ceiling formed of suitable timber framing with 250 micron polyethylene sheeting stapled on including corners, ends, etc. | m | 10 |
|---|---|---|----|

REMOVAL OF EXISTING WORK**Breaking up and removing mass concrete**

- | | | | |
|---|-------------------------|----|-----|
| 2 | Steps | m3 | 1 |
| 3 | Ramps, etc. | m3 | 12 |
| 4 | 120mm Thick surface bed | m2 | 129 |

Breaking up and removing reinforced concrete including cutting off and removing reinforcement

- | | | | |
|---|--|----|----|
| 5 | 813 x 2032mm Opening through 200mm thick concrete wall for new fire door. (Elsewhere measured) | No | 12 |
|---|--|----|----|

Taking out and removing doors, etc. from steel/wooden frames

- | | | | |
|---|--|----|-----|
| 6 | Timber single door not exceeding 2,5m2 | No | 260 |
|---|--|----|-----|

Taking out and removing doors, windows, etc from brickwork

- | | | | |
|---|--------------------------------------|----|----|
| 7 | Steel door frame not exceeding 2,5m2 | No | 10 |
|---|--------------------------------------|----|----|

Taking out and removing external terra-cotta window sills and prepare to receive new. (Elsewhere measured)

- | | | | |
|---|--------------------------|---|-----|
| 8 | Terra-cotta window sill. | m | 330 |
|---|--------------------------|---|-----|

Taking out and removing doors, windows, etc including thresholds, sills, etc and building up openings in brick walls including making good cement plaster on both sides (making good paintwork elsewhere)

Carried to Collection

R

Section: 2
 Bill No. 1
 ALTERATIONS
BTKM QUANTITY SURVEYORS

Refixing of new steel door frames, windows, etc. (removal elsewhere)

- 9 Setting up and building in steel door frame in existing brickwork size approximately 813 x 2450 including fanlight to match existing

No 10

Taking down and removing roofs, floors, panelling, ceilings, partitions, etc.

- 10 Sheet iron roof covering with ridge capping, box gutter, eave soffit covering, fascia's, barge boards, gutters, rainwater pipes, etc.

m2 4,713

- 11 Pitched timber roof construction approximately 17.53m x 11.61m x 1.63m high overall including timber trusses, purlins and wall plates. *(Please note that the trusses are approximately 7.16m at ridge level above ground level)* (Block A1)

No 1

- 12 Ditto, approximately 23.42m x 11.61m x 1.63m high overall including timber trusses and purlins, ditto. (Block A2)

No 1

- 13 Pitched timber roof construction approximately 21.00m x 11.70m x 1.63m high overall including timber trusses, purlins and wall plates. *(Please note that the trusses are approximately 7.16m at ridge level above ground level)* (Block B1)

No 1

- 14 Ditto, approximately 17.41m x 11.61m x 1.63m high overall. (Block B2)

No 1

- 15 Pitched timber roof construction approximately 17.53m x 11.61m x 1.63m high overall including timber trusses and purlins, purlins and wall plates. (Block C1)

No 1

- 16 Ditto, approximately 23.42m x 11.61m x 1.63m high overall. (Block C2)

No 1

- 17 Pitched timber roof construction approximately 17.53m x 11.61m x 1.63m high overall including timber trusses and purlins, purlins and wall plates. *(Please note that the trusses are approximately 7.16m at ridge level above ground level)* (Block D1)

No 1

- 18 Ditto, approximately 23.42m x 11.61m x 1.63m high overall. (Block D2)

No 1

Carried to Collection

R

Section: 2

Bill No. 1

ALTERATIONS

BTKM QUANTITY SURVEYORS

19	Pitched timber roof construction approximately 17.53m x 11.61m x 1.63m high overall including timber trusses and purlins, purlins and wall plates. <i>(Please note that the trusses are approximately 7.16m at ridge level above ground level)</i> (Block E1)	No	1
20	Ditto, approximately 23.42m x 11.61m x 1.63m high overall. (Block E2)	No	1
21	Pitched timber roof construction approximately 17.53m x 11.61m x 1.63m high overall including timber trusses and purlins, purlins and wall plates. (Block F1)	No	1
22	Ditto, approximately 17.17m x 11.61m x 1.63m high overall. (Block F2)	No	1
23	Pitched timber roof construction approximately 16.70m x 16.70m x 1.80m high overall including timber trusses and purlins, purlins and wall plates. <i>(Please note that the trusses are approximately 4.50m at ridge level above ground level)</i> (Hall)	No	1
24	Pitched timber roof construction approximately 9.75m x 11.70m x 1.80m high overall including timber trusses and purlins, purlins and wall plates. <i>(Please note that the trusses are approximately 4.50m at ridge level above ground level)</i> (Boardroom)	No	1
25	Pitched timber roof construction approximately 17.90m x 18.60m x 1.80m high overall including timber trusses and purlins, purlins and wall plates. <i>(Please note that the trusses are approximately 4.50m at ridge level above ground level)</i> (Kitchen)	No	1
26	Pitched timber roof construction approximately 11.5m x 14.10m x 1.80m high overall including timber trusses and purlins, purlins and wall plates. <i>(Please note that the trusses are approximately 4.50m at ridge level above ground level)</i> (Mess Hall)	No	1
<u>Taking down and removing, ceilings, partitions, etc.</u>			
27	Gypsum plasterboard ceilings including timber brandering, timber cornices, fibreglass insulation on top, etc.	m2	2,824
28	Drywall partitioning 3m high including doors, ironmongery, glazed borrowed lights, etc.	m	8

Carried to Collection

R

Section: 2

Bill No. 1

ALTERATIONS

BTKM QUANTITY SURVEYORS

Taking out and removing sundry joinery work

29	Timber skirtings from brickwork/concrete	m	3,916	
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Taking out and removing joinery fittings etc

30	Existing timber wooden shelve 1200mm wide x 200mm high extreme, with and including filling of holes, etc. to approval of the representative	No	192	
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31	Existing timber headboard 1200mm wide x 600mm high extreme, with and including filling of holes, etc. to approval of the representative	No	192	
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Taking out and removing joinery fittings etc.

32	Timber vanity floor cupboard 1200 x 600 x 900mm high with and including existing basin, taps, traps, etc. and disconnect water supply and waste pipes for re-use later.	No	184	
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33	Timber sink cupboard 3500 x 600 x 950mm high including disconnecting waste pipe (new trap and connecting to new waste pipe elsewhere)	No	2	
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34	Timber counter 5000 x 600 x 1000mm high	No	1	
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35	Timber bedroom cupboard size approximately 1255mm wide x 2695mm high with and including of doors, shelves, ironmongery, etc.	No	120	
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Taking up and removing vinyl floor coverings, carpeting, etc

Remove existing Terrazzo tiles, Ceramic, or Vinyl flooring including existing screed, to a good sound concrete base. Thoroughly clean concrete with a wire brush, removing all loose material before floating up new screed.

36	Vinyl tile floor covering including preparing screed for new vinyl floor covering	m2	48	
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37	Carpet tile floor covering including preparing screed for new carpeting	m2	3,451	
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38	Ditto to treads and risers of stairs, ditto	m2	40	
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Carried to Collection

Section: 2

Bill No. 1

ALTERATIONS

BTKM QUANTITY SURVEYORS

R

Taking out and removing ironmongery

39	Stair nosing 1500mm wide	No	80
40	Mortice lock and striking plate from timber door and steel frame	No	200
41	Cupboard door handles from timber door	No	732
42	Ditto, door lock.	No	272
43	Chromium plated towel rail including 2 brackets not exceeding 1000mm long including filling of holes, etc.	No	196
44	Ditto but shower rails with curtains	m	22
45	Chromium plated toilet paper holder	No	90
46	Ditto, ceramic build-in toilet roll holder.	No	45
47	Ditto, lockable mild steel toilet roll holder.	No	45
48	Soap dish.	No	33
49	Chromium plated hat and coat hook	No	36
50	Existing vertical blinds with and including all brackets and filling of holes to approval of the representative size 1200mm wide x 1500mm high	No	223

Taking out/off and removing sundry metalwork

51	Cut out internal horizontal and vertical steel window sections including removal of glass and putty leaving the outer-frame only and prepare frame to receive new aluminium casement window system (new aluminium casement system elsewhere measured)	No	191
52	Ditto, existing aluminium windows n.e. 2.5m2	No	69
53	Brick pattern steel burglar proofing with framing bolted to brickwork and making good of plaster/concrete	No	192

Carried to Collection

R

Section: 2
Bill No. 1
ALTERATIONS
BTKM QUANTITY SURVEYORS

Hacking up/off and removing granolithic, screeds, plaster, etc. from concrete or brickwork and prepare surfaces for new screeds, plaster, etc.

54	25mm Screed from floors	m2	12
55	Internal plaster from walls and columns	m2	120
56	Internal plaster from ceilings and beams	m2	55
57	External plaster from walls, columns and beams	m2	27

Hacking up/off and removing ceramic tile floor and wall finishes including removing mortar bed or backing and preparing concrete or brick surfaces for new screed, plaster or tile finishes

58	Existing 300 x 300mm Tiles to floors	m2	1,096
59	Ditto, to walls	m2	1,922
60	Tiles to treads and risers of stairs	m2	50
61	200 x 200mm Tiles to walls, splashbacks, etc.	m2	198
62	Tile skirting 100mm high	m	50

Taking out and removing piping, sanitary fittings, etc including disconnecting piping from fittings and making good floor and wall finishes (making good tiling and paintwork elsewhere)

63	Galvanised steel piping including fittings and brackets	m	150
64	Cast iron piping including fittings and brackets	m	30
65	Copper piping including fittings and brackets	m	250
66	Stainless steel wash hand basin	No	2
67	Stainless steel sink and drainer on timber cupboard 2000 x 600 x 950mm high	No	1
68	Vitreous china wash hand basin with and including tap, traps, etc.	No	216

Carried to Collection

R

Section: 2
Bill No. 1
ALTERATIONS
BTKM QUANTITY SURVEYORS

69	Vitreous china WC pan with cistern and pan connector where necessary	No	46
70	Vitreous china WC pan with flush valve	No	27
71	Vitreous china wall hung urinal with flush valve	No	16
72	Existing 250 litre geysers with and including valves, geyser pan, pipework, etc.	No	39
73	Existing fat trap complete with and including filling of hole with G5 material compacted to 95% mod AASHTO density and sealing off existing pipes. (New fat trap elsewhere measured)	No	1
74	Excavate and remove existing cast iron/clay sewer line not exceeding 2m deep between manholes, etc.	m	85
75	Break up and remove existing brick manhole exceeding 1m and not exceeding 1,5m deep with and including filling of hole with G4 imported material and compact in 150mm layers to 95% mod AASHTO density to approval of the engineer	No	3
<u>Taking out and removing glass and mirrors</u>			
76	Glass from steel windows including cleaning out rebates and preparing for new glass	m2	17
77	Mirror 600 x 1200mm high from wall	No	196
<u>Taking out/off and removing sundry electrical work</u>			
78	Steel power skirting fixed to walls to approval of the representative	m	771
79	Mirror vanity light 650mm long	No	168
<u>BUILDING UP OPENINGS</u>			
<u>Brickwork in NFP bricks in class II mortar in building up openings</u>			
80	Half brick walls	m2	12
81	One brick walls	m2	6

Carried to Collection

R

Section: 2

Bill No. 1

ALTERATIONS

BTKM QUANTITY SURVEYORS

Sundries

82	Cutting toothings and bonding new brickwork to existing	m2	26
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PREPARATORY WORK TO EXISTING SURFACES**WASH DOWN**

Wash down with granular sugar soap according to manufacturer's instructions. Wash down with clean water.

REPAIR

Remove any loose plaster or paint back to a firm substrate by scraping, sanding, etc. Remove all visible nails etc. projecting from walls.

Repair cracks, any imperfections and/or damage caused by removal of existing fittings or finishes etc. Fill with approved interior filler for interior repairs, and approved exterior filler for exterior repairs). Sand smooth and true to existing surface.

PRIME

Sand down. Apply one coat alkali resistant plaster primer thinned down 20% by volume with mineral turpentine. Allow 24 hours drying time.

SPOT PRIME

Sand down defective area, removing all loose and flaky paint, to bare plaster. Apply one coat alkali resistant plaster primer thinned down 20% by volume with mineral turpentine. Allow 24 hours drying time.

SAND

Sand down existing painted walls to a matt surface to ensure paint adhesion. Dust down to remove all powdery material. Wash with sugar soap. Wash with clean water. Allow to dry.

MAKING GOOD OF FINISHES ETC

83	Cutting out joints of existing brickwork to receive plaster	m2	22
84	Hacking face of existing concrete columns, beams, etc to receive plaster	m2	13

Carried to Collection

R

Section: 2

Bill No. 1

ALTERATIONS

BTKM QUANTITY SURVEYORS

Section: 2
Bill No. 1
ALTERATIONS
BTKM QUANTITY SURVEYORS

Section: 2

Bill No. 1

ALTERATIONS

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

33

34

35

36

37

38

39

40

41

42

43

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 1

ALTERATIONS

BTKM QUANTITY SURVEYORS

ESTABLISHMENT

2 Transporting and establishment on site of necessary plant for the execution of the work and removal thereof on completion

Item

3 Setting up plant at pile position

No

8

CONCRETE CAST IN SITU AUGERED PILES

Drilling not exceeding 10m deep in all classes of strata excluding hard rock below ground level

4 350mm Diameter pile shafts

No

34

5 600mm Diameter pile shafts

No

12

6 Extra over drilling 350mm diameter pile shaft for under-reaming expanded bulb 700mm diameter extreme

No

34

7 Ditto, for 600mm pile, ditto.

No

12

Drilling in strata of a more difficult character

8 Extra over drilling and under-reaming in all classes of strata except hard rock for drilling in hard rock

m3

35

Extra over drilling for carting away

9 Surplus material from pile holes to a dumping site to be located by the contractor

m3

102

Casings

10 Permanent casing to 350mm diameter pile shaft to prevent collapse of excavations, ingress of water, etc

m

272

11 Ditto to 600mm diameter pile

m

96

25MPa/19mm reinforced concrete

12 350mm Diameter piles not exceeding 10m deep

m3

34

13 600mm Diameter, ditto.

m3

27

14 700mm Diameter expanded bulb at bottom of 350mm diameter pile

No

43

Carried to Collection

R

Section: 2

Bill No. 2

PILING

BTKM QUANTITY SURVEYORS

15	Ditto, at bottom of 600mm diameter pile	No	12
	<u>Formwork</u>		
16	Formwork to 350mm diameter pile above ground level	m	82
17	Formwork to 600mm diameter pile above ground level	m	48
	<u>TEST BLOCKS</u>		
18	Making and testing set of three 150 x 150mm concrete strength test cube	No	46
	<u>REINFORCEMENT</u>		
	<u>Mild steel reinforcement</u>		
19	8mm Diameter bars	t	0.05
	<u>High tensile steel reinforcement</u>		
20	16mm Diameter bars	t	0.12
	<u>EXPOSING PILES FOR INSPECTION</u>		
21	Exposing pile for inspection including excavation 12m deep in ground and backfilling	No	44
	<u>TRIMMING ETC</u>		
	<u>Stripping back head of concrete pile for a height not exceeding 500mm to expose reinforcement including trimming to defined level and bending reinforcement as necessary for casting into pile cap or ground beam</u>		
22	350mm Diameter pile	No	34
23	600mm Diameter, ditto.	No	12
	<u>TESTING</u>		
24	Transporting and establishment on site of necessary testing plant for the execution of the work and removal thereof on completion		Item
25	Testing 350mm diameter pile to a maximum load of 500kN	No	34

Carried to Collection

R

Section: 2
Bill No. 2
PILING
BTKM QUANTITY SURVEYORS

26	Testing 600mm diameter pile to a maximum load of 1 000 kN	No	12
	<u>PILE CAPS</u>		
	<u>EXCAVATIONS</u>		
	<u>Excavate in earth not exceeding 2m deep below natural, compacted and elevated or reduced ground level for</u>		
27	Pile caps	m3	36
	<u>Extra over pile cap excavations in earth for excavations in</u>		
28	Soft rock	m3	11
29	Hard rock	m3	10
	<u>Sundries</u>		
30	Extra over all excavations for carting away surplus material from excavations and/or stockpile on site to a dumping site to be located by the Contractor	m3	12
31	Back excavation of vertical sides of excavations for pile caps in earth not exceeding 500mm deep as necessary for working space for placing and removing formwork to sides of pile caps 115mm away from excavated face, including imported backfilling compacted to 90% modified AASHTO density	m2	38
32	Risk of collapse of sides of excavations for pile caps from natural, elevated or reduced ground level to not exceeding 1,5m deep	m2	38
33	Allow for keeping all excavations entirely free of all water other than subterranean water		Item
	<u>REINFORCED CONCRETE</u>		
	<u>25MPa/19mm concrete</u>		
34	Pile caps	m3	27
	<u>TEST BLOCKS</u>		
35	Making and testing set of three 150 x 150 x 150mm concrete strength test cube	No	46

Carried to Collection

R

Section: 2

Bill No. 2

PILING

BTKM QUANTITY SURVEYORS

SPECIAL FORMWORK (DEGREE OF ACCURACY I)

Special formwork to sides

36	Pile caps	m2	84
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REINFORCEMENT

High tensile steel reinforcement to structural concrete work

37	12mm Diameter bars	t	2.00
38	16mm Diameter bars	t	3.00
39	20mm Diameter bars	t	3.50
40	25mm Diameter bars	t	3.50

SUNDRIES

41	500 x 500 x 50mm Thick precast concrete slabs to close void openings between pile caps and ground beams	m	158
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Carried to Collection

R

Section: 2
Bill No. 2
PILING
BTM QUANTITY SURVEYORS

Section: 2

Bill No. 2

PILING

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

45

46

47

48

49

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 2

PILING

BTKM QUANTITY SURVEYORS

[illegible]

-52-

8	Slabs, etc.	m3	10
<u>TEST BLOCKS</u>			
9	Making and testing set of three 150 x 150 x 150mm concrete strength test cube	No	25
<u>CONCRETE SUNDRIES</u>			
<u>Finishing top surfaces of concrete smooth with a steel trowel</u>			
10	Surface beds, slabs, etc	m2	81
11	Tops of beams, walls, etc	m2	62
12	Sloping ramps, etc.	m2	89
<u>SMOOTH FORMWORK (DEGREE OF ACCURACY II)</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 111)</u>			
<u>Smooth formwork to sides of concrete</u>			
13	Foundation beams of staircases	m2	93
14	Rectangular columns in foundations	m2	3
15	Rectangular columns with total height exceeding 5m and not exceeding 6,5m above bearing level	m2	55
16	Rectangular stub columns in foundations	m2	3
17	Isolated beams	m2	115
18	Edges not exceeding 300mm high	m2	32
<u>Smooth formwork to soffits of concrete</u>			
19	Ramps, etc.	m2	5
20	Landings, etc.	m2	15

Carried to Collection

R

Section: 2
 Bill No. 4
 CONCRETE, FORMWORK AND REINFORCEMENT
BTKM QUANTITY SURVEYORS

21	Stairs with sloping soffits propped up not exceeding 1,5m high	m2	24
22	Ditto, propped up exceeding 1.5m and not exceeding 3m high	m2	24

REINFORCEMENT**(HAYLETT FORMULA WORK GROUP NO. 114)****High tensile steel reinforcement to structural concrete work**

23	20mm Diameter bars	t	1.16
24	16mm Diameter bars	t	0.59
25	12mm Diameter bars	t	3.11
26	10mm Diameter bars	t	2.93
27	8mm Diameter bars	t	0.20

SUNDRIES**High tensile steel dowel bars**

28	20mm Diameter dowel bar 400mm long with one end embedded 300mm deep inside of concrete at expansion joint and other end greased and wrapped in polythene sheeting including hole through formwork.	No	30
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Fabric reinforcement

29	Type 245 fabric reinforcement in concrete surface beds, slabs, etc	m2	227
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MOVEMENT JOINTS**(HAYLETT FORMULA WORK GROUP NO. 110)**

30	Movement joint not exceeding 300mm high formed of 12mm bitumen impregnated softboard placed vertical in position between concrete surface bed or floor slab and brick or concrete walls, columns, etc	m	44
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Carried to Collection

R

Section: 2
 Bill No. 4
 CONCRETE, FORMWORK AND REINFORCEMENT
BTM QUANTITY SURVEYORS

31	"Compriband Migua FV 30/3550" or other approved sealing strip fitted into expansion joint	m	60
<u>Expansion joints with 15mm Durachord backing chord between vertical concrete and brick surfaces</u>			
32	15mm Joints not exceeding 300mm high	m	16
33	10mm Jointex in expansion joint	m	16
<u>Saw cut joints</u>			
34	10 x 10mm Saw cut joints in top of concrete filled with DOW corning 813 sealant and 15mm Dura Chord	m	16
<u>SUNDRIES</u>			
35	Hoop iron anchors between concrete and brickwork	No	60

Carried to Collection

R

Section: 2
 Bill No. 4
 CONCRETE, FORMWORK AND REINFORCEMENT
BTKM QUANTITY SURVEYORS

Section: 2

Bill No. 4

CONCRETE, FORMWORK AND REINFORCEMENT

COLLECTION

Total Brought Forward from Page No

Page
No

52

53

54

55

Amount

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 4

CONCRETE, FORMWORK AND REINFORCEMENT

BTKM QUANTITY SURVEYORS

Item No			Quantity	Rate	Amount
	<u>SECTION 2</u>				
	<u>BILL NO. 5</u>				
	<u>MASONRY</u>				
	<u>PREAMBLES</u>				
	For Preambles refer to "Specification of Materials and Methods to be used PW 371"				
	<u>BRICKWORK IN CLAY BRICKS IN CEMENT MORTAR</u>				
	<u>(HAYLETT FORMULA WORK GROUP NO. 118)</u>				
1	Half brick wall.	m2	416		
2	Half brick wall in beamfilling	m2	235		
3	Half brick wall in lining to concrete including wire ties.	m2	5		
4	One brick wall.	m2	96		
	<u>BRICK REINFORCEMENT</u>				
5	R8 mild steel reinforcement cut to lengths and and built into brick lintels.	t	0.10		
6	Brick reinforcement 75mm wide built into brick walls with sufficient laps at end joints	m	39		
7	Ditto, in lintels.	m	32		
8	Brick reinforcement 150mm wide built into brick walls with sufficient laps at end joints, angles and intersections. (measured net)	m	193		
	<u>TEMPORARY TURNING PIECES, ETC</u>				
9	To flat brick lintels not exceeding 300mm wide.	m	6		
	Carried to Collection				R
	Section: 2				
	Bill No. 5				
	MASONRY				
	BTKM QUANTITY SURVEYORS				

SUNDRIES

10	Fill top of pressed steel door frame, suitable for half brick wall with cement mortar and trowel smooth.	m	2
11	38 x 1,6mm Galvanised hoop iron roof tie with one end built six courses deep into top of brickwork and other end wrapped around and nailed to trusses.	No	10
12	Ditto, with one end fixed to concrete and the other end fixed to light steel trusses	No	875

AIR BRICKS

13	Set of two 222 x 155mm terra-cotta vermin proof air bricks above each other with gauze backing and building into opening in brickwork in cement mortar.	No	3
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MOVEMENT JOINTS

14	Movement joint formed of 20mm softboard built in vertically between brick skins.	m2	2
15	Movement joint not exceeding 300mm wide formed of 20mm softboard built in vertically between brickwork.	m	20
16	Movement joint coverstrip formed 80 x 3mm mild steel flat section holed along one side at 600mm centres for and bolted to brickwork with and including M6 x 70mm expansion bolts.	m	3

FACED BRICKWORK

"Roan Satin" FBX or other similar approved face bricks to Architect's specifications, pointed with square recessed horizontal and vertical joints

17	Extra over ordinary brickwork for facing and pointing in stretcher bond.	m2	36
18	Ditto in beamfilling	m2	7
19	Fair raking cutting.	m	12

Carried to Collection

R

Section: 2
 Bill No. 5
 MASONRY
BTKM QUANTITY SURVEYORS

20	Face brick-on-edge flat lintel course in cement mortar 220mm wide on soffit and pointing on 110mm wide projecting soffit and one side.	m	2
21	Cut face brick-on-edge external window sill, 180mm wide, set sloping and slightly projecting in cement mortar and pointed on top, front edge and projecting soffit including all necessary fair raking cutting to facings under and fair and fitted ends.	m	6
<u>QUARRY TILE SILLS OF APPROVED COLOUR BEDDED AND JOINTED IN CEMENT MORTAR AND NEATLY POINTED WITH 6mm WIDE HALF ROUND JOINTS IN COLOURED CEMENT MORTAR</u>			
22	Internal window sill 100mm wide formed with 152 x 152 x 16mm thick cut tiles set flat including fair and fitted ends.	m	2
23	Ditto, but externally bedded in cement mortar.	m	330

Carried to Collection

R

Section: 2
 Bill No. 5
 MASONRY
BTKM QUANTITY SURVEYORS

Section: 2
Bill No. 5
MASONRY
COLLECTION

Total Brought Forward from Page No

Page No	Amount
57	
58	
59	

Carried Forward to Summary of Section No: 2

R

Section: 2
Bill No. 5
MASONRY
BTKM QUANTITY SURVEYORS

Section: 2
Bill No. 6
WATERPROOFING
BTKM QUANTITY SURVEYORS

Item No		Quantity	Rate	Amount
	<u>SECTION 2</u>			
	<u>BILL NO. 7</u>			
	<u>ROOF COVERINGS, ETC</u>			
	<u>PREAMBLES</u>			
	For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
	<u>(HAYLETT FORMULA WORK GROUP NO. 124)</u>			
	<u>0.53mm Thick 700mm cover Klip-Tite™ profile zincalume® az150 spelter g550 shadow grey backing coat roof sheeting or other similar approved, fixed to timber intermediate purlins at maximum 1200mm centres and eaves and ridge purlins at maximum 1200mm centres using KL700 plus clips fixed with 10 no.11x 45mm long self drilling wafer head ph2 screws, type 17 drill point fasteners, all in accordance with the manufacturers specifications.</u>			
	NOTE : The Contractor is to submit a certificate signed by the merchant, stating that the galvanized roof covering supplied complies with the required thickness specified.			
1	0,6mm roof sheeting with pitch not exceeding 25 degrees fixed to light steel construction. (elsewhere)	m2	5,092	
2	Ditto, to eave cladding, soffits, etc.	m2	2,100	
3	0,6mm Sheet iron gable trim 370mm girth three times bent to detail and fixed to roof sheeting. (elsewhere)	m	201	
4	0,6mm 550mm Girth ridge covering fixed to light steel construction. (elsewhere)	m	430	
	Carried Forward to Summary of Section No: 2		R	
	Section: 2			
	Bill No. 7			
	ROOF COVERING, ETC.			
	BTKM QUANTITY SURVEYORS			

Amount

DESCRIPTIONS

R

Section: 2
Bill No. 8
CARPENTRY AND JOINERY
BTKM QUANTITY SURVEYORS

PREFABRICATED LIGHT STEEL ROOF CONSTRUCTION ACCORDING TO SANS BY SPECIALIST

89 x 41 x 11 x 0.8mm Thick cold formed steel, used for the structures of light steel frame buildings, shall comply with the requirements of an internationally recognized standard and shall have a coating at least equivalent in corrosion resistance and robustness to a 100 g/m2 aluminium-zinc coating (AZ100).

Light structural steel members shall be manufactured using the prescribed steel strength grade (of 500 MPa or 550 MPa minimum yield strength) in accordance with the design specification.

The material shall comply with the requirements of SANS 3575 or SANS 4998 (or both), or SANS 9364.

All steel used shall have sufficient formability to allow the cold forming of profiles without any cracking of the steel substrate. Steel elements shall comply with the dimensional and straightness tolerances given in SANS 517 - 5.13.1

1	Double pitched roof construction for building size 45m x 12m x 1,8m high measured to outer walls with and including frame for closed overhang on both sides as per detail. (Block A) (Double storey)	No	1
2	Ditto, but size 80m x 12m (Block B) (Double storey)	No	1
3	Ditto, but size 45m x 12m (Block C) (Double storey)	No	1

Carried to Collection

R

Section: 2
Bill No. 8
CARPENTRY AND JOINERY
BTKM QUANTITY SURVEYORS

4	Ditto, but size 80m x 12m (Block D) (Double storey)	No	1		
5	Ditto, but size 45m x 12m (Block E) (Double storey)	No	1		
6	Ditto, but size 45m x 12m (Block F) (Double storey)	No	1		
7	Ditto, but size 17m x 17m (Block G) (Single storey)	No	1		
8	Ditto, but size 17m x 17m (Block H) (Single storey)	No	1		
9	Ditto, but size 14,10m x 11,45m (Block I) (Single storey)	No	1		
10	Ditto, but size 10m x 12m (Block J) (Single storey)	No	1		
11	Ditto, but size 18m x 19m (Block K) (Single storey)	No	1		
<u>ROOF SUNDRIES</u>					
12	3,2mm Galvanised truss/purlin wire tie 2000mm long.	No	875		
<u>FASCIAS AND BARGEBOARDS</u>					
<u>Tempered fibre cement</u>					
13	15 x 225mm Fascia or barge board countersunk screwed to support and roof timbers (elsewhere) with one brass screw at maximum 750mm centres and jointed with and including standard aluminium halfround cover strips at all joints	m	50		
<u>SKIRTINGS</u>					
<u>Wrot Meranti</u>					
14	19 x 75mm Hardwood skirting, with 19mm hardwood quadrant beading. Finish as per decoration schedule. Fix with 5mmø x 50mm long "Hilti" or other similar approved screws at maximum 500mm centres	m	3,626		
<u>DOORS</u>					
				R	
<p style="text-align: right;">Carried to Collection</p> <p>Section: 2 Bill No. 8 CARPENTRY AND JOINERY BTKM QUANTITY SURVEYORS</p>					

NOTE:

All framed and ledged batten doors and combination doors, where battens are utilised, shall only be of construction acceptable to the Department, i.e. mortice and tennon where the tennon is exposed on the outside edges of styles and where the tennons wedged to form a dovetailed shape.

Wrot Meranti

- | | | | |
|----|--|----|---|
| 15 | 40mm x 0,813 x 2,032m Framed, ledged and braced batten door formed of 40 x 110mm styles and top rail, 20 x 225mm bottom ledge, 20 x 150mm middle ledge and 20 x 110mm diagonal braces, filled in flush one side with 20mm x 75mm tongued, grooved and V-jointed both sides vertical boarding fixed in and including grooves in styles and top rail | No | 6 |
|----|--|----|---|

Semi-solid laminated flush panel doors with hardboard face suitable for paint both sides and two Wrot Meranti concealed vertical edge strips

- | | | | |
|----|----------------------------|----|----|
| 16 | 40mm x 0,813 x 2,033m door | No | 17 |
|----|----------------------------|----|----|

Solid laminated flush panel doors with hardboard face suitable for paint both sides and two Wrot Meranti concealed vertical edge strips

- | | | | |
|----|----------------------------|----|----|
| 17 | 40mm x 0,813 x 2,033m door | No | 71 |
|----|----------------------------|----|----|

- | | | | |
|----|----------------------------|----|---|
| 18 | 40mm x 0,915 x 2,033m door | No | 3 |
|----|----------------------------|----|---|

JOINERY FITTINGS

THE FOLLOWING IN PINNING BOARDS, WRITING BOARDS, PROJECTION SCREENS, ETC.

- | | | | |
|----|---|----|-----|
| 19 | 600 x 900mm Prefabricated pinning board consisting of premier pinning surface and aluminium frame and fixed in position | No | 1 |
| 20 | Ditto, size 900 x 1200mm. | No | 220 |
| 21 | Ditto, size 1000 x 1500mm. | No | 4 |

Carried to Collection

R

Section: 2
Bill No. 8
CARPENTRY AND JOINERY
BTKM QUANTITY SURVEYORS

22	900 x 600mm Prefabricated wall mounted whiteboard, complete with aluminium penrail fixed to wall in position to Architect's specifications	No	36
----	--	----	----

THE FOLLOWING IN SHELVING IN STORES, ETC.

Wrot laminated softwood

23	22mm Shelves screwed on	m2	60
24	22mm Shelves screwed on and notched around standards	m2	22
25	Laminated pine shelf 400mm wide	m	160

Wrot softwood

26	32 x 44mm Framed framing	m	85
27	32 x 44mm framed framing plugged	m	120

THE FOLLOWING IN KEYBOARDS

Blockboard with Meranti veneer on one side

28	Key board size 600mm wide x 1100mm high with 6mm SA Pine solid edge strips around the perimeter, finished with three coats polyurethane clear varnish and fitted with eighty "screw in" type solid brass key hooks in eight rows of ten hooks each, including two solid brass suspension hook holders attached to key board and two brass screws fixings secured to wall	No	1
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Carried to Collection

R

Section: 2
Bill No. 8
CARPENTRY AND JOINERY
BTKM QUANTITY SURVEYORS

FITTINGS**General:**

The following joinery fittings have been measured as complete units i.e. the components of the units have not been separately measured

The descriptions, therefore, of such units shall be deemed to include all components, assembling, housing, notching, glueing, blocking, planting on and screwing with countersunk screws, edge strips, decorative plastic finish, glass, ironmongery, painting, etc

Each item refers to the attached detail drawings

Cupboards, etc

16mm MFP pressed wood with melamine finish both sides and all visible areas to be covered with 16mm wide PVC edging 2mm Thick. (Colour: Cappucino)

29	Kitchen cupboard size 1930mm long x 950mm high x 550mm deep	No	2
30	Floor cupboard size 1220mm long x 768mm high extreme x 550mm deep consisting of 150mm high x 25mm thick pine skirting board to floor with and including two 500mm wide x 615mm high pine slatted self-closing doors with 50mm wide frame with semi-concealed variable overlay hinges with satin nickel finish and two 150mm Stainless steel barrel handles (Brushed satin finish) . Two cupboard doors to close onto 150mm wide x 768mm high dividing panel. (Paint work elsewhere measured.)	No	150
31	Extra over for 535mm wide x 1220mm wide x 3m thick Granite top with and including cut-out to receive vanity basin. (Elsewhere measured)	No	150

Carried to Collection

R

Section: 2

Bill No. 8

CARPENTRY AND JOINERY

BTKM QUANTITY SURVEYORS

32	Bedroom cupboard size 1255 x 2695mm extreme overall consisting of wood panel size 1220 x 200mm wide to top and one horizontal top shelve 600mm wide supported by 50 x 16mm bearers all round and the bottom half of the cupboard divided in two sections by 600mm wide x 1684mm vertical section. The left side to be left open to provide hanging space with and including 35mm diameter aluminium rod with standard holding bats on both sides. The right section of the cupboard to be provided with four shelves size approximately 600mm wide x 600mm deep with supporting bearers. Double doors to be approximately 1255 mm wide x 2430mm high hanged with three pair concealed 95 degree heavy duty steel type steel hinges, one pair stainless steel 150mm stainless steel brushed satin finish and one stainless steel hasp and staple size 114 x 36mm for medium padlock. (Padlock by others)	No	65
33	Ditto, but without hanging space and four shelves in same position	No	28
<u>Seating benches, etc.</u>			
34	Slatted seating benches consisting of eight x 50 x 25mm slats bolted to steel frame. (Elsewhere measured)	m2	15

Carried to Collection

R

Section: 2
Bill No. 8
CARPENTRY AND JOINERY
BTKM QUANTITY SURVEYORS

Section: 2

Bill No. 8

CARPENTRY AND JOINERY

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

63

64

65

66

67

68

69

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 8

CARPENTRY AND JOINERY

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<u>SECTION 2</u>			
<u>BILL NO. 9</u>			
<u>CEILINGS, PARTITIONS AND ACCESS FLOORING</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
<u>(HAYLETT FORMULA WORK GROUP NO. 129)</u>			
<u>SUPPLEMENTARY PREAMBLES</u>			
<u>Fixing</u>			
Items described as "nailed" shall be deemed to be fixed with hardened steel nails or pins, or to be shot-pinned, to brickwork or concrete			
Items described as "plugged" shall be deemed to include screwing to fibre, plastic or metal plugs at not exceeding 500mm centres, and where described as "bolted", the bolts have been given elsewhere			
<u>Ceilings</u>			
Unless otherwise described ceilings shall be deemed to be horizontal			
<u>Bulkheads</u>			
Bulkheads are defined as those portions of ceilings which are stepped down from the general ceiling level in a particular room or area and which generally occur along the perimeter. Their purpose is either to conceal services or to create architectural features			
Carried to Collection			
Section: 2 Bill No. 9 CEILINGS, PARTITIONING AND ACCESS FLOORING BTKM QUANTITY SURVEYORS			R

Bulkheads have only been described as such where they conform to the above definition and where the horizontal or vertical dimensions do not exceed 900mm. Where these dimensions are more than 900mm such portions of ceilings have been included in the appropriate general items of ceilings

Unless otherwise described bulkheads shall be deemed to be horizontal along the length

Steel components

All steel components for ceilings, partitions, etc. are to be galvanised in accordance with SANS 121

CEILING TIMBERS, BEADS, INSULATION, ETC

CEILINGS

Plasterboard ceilings

For new ceilings, install new 38 x 38mm SA Pine brandering at 400mm centres. Fix new 6.4mm gypsum board fixed at right angles to brandering (printed side up) with 32mm galvanised clout nails at 150mm c/c. Spot prime all nail heads with zinc chromate metal primer, strictly according to manufacturer. Apply 2 coats Super Acrylic PVA, allowing 24 hours between coats.

1	Horizontal ceiling formed of 6,4mm thick boards with open joints for and including pre-primed H-section cover strips neatly mitred at intersections and nailed to and including 38 x 50mm sawn softwood brandering at 400mm centres in one direction securely spiked to roof timbers and ceiling joists (elsewhere)	m2	14
2	Extra over gypsum plasterboard ceiling for hinged pressed metal trap door size 600 x 600mm including all necessary ironmongery	No	1

Sawn softwood

3	38 x 38mm Trimmers around light fittings (elsewhere)	m	25
4	38 x 38mm Hangers	m	25
5	38 x 76mm Runners	m	25

Carried to Collection

R

Section: 2
Bill No. 9
CEILINGS, PARTITIONING AND ACCESS FLOORING
BTKM QUANTITY SURVEYORS

6	38 x 114mm Ceiling joists	m	40
<u>Fibre cellulose board ceilings</u>			
7	Horizontal ceiling formed of 6mm thick boards with open joints for and including pre-primed H-section cover strips neatly mitred at intersections and nailed to and including 38 x 50mm sawn softwood brandering at 400mm centres in one direction securely spiked to roof timbers and ceiling joists (elsewhere)	m2	75
8	Extra over fibre cement ceiling for hinged pressed metal trap door size 600 x 600mm including all necessary ironmongery	No	5
<u>Wrot softwood</u>			
9	19 x 50mm Cornice fixed on flat to brandering	m	80

SUSPENDED CEILINGS

SUPPLEMENTARY PREAMBLES

C4.1 SUSPENDED

New suspended ceiling consisting of galvanized steel members with aluminium facings - T38 CEILING Exposed Grid system with T38 (3600) main tees at 600mm centres, T38 (1200) at 1200mm centres, (vinyl clad fibre SM 25 recessed wall angles and flush plaster trim sections for bulkheads, all with Vivid White finish cement) and suspended with 2.5mm diameter galvanised wires, fixed to brandering or riveted to underside of concrete slabs with steel pop rivets. All strictly in accordance with manufacturer's specifications

Proprietary suspended ceilings

Hangers, suspension grids, "lay-in" panels, etc are to be in accordance with the manufacturers' recommendations

User note

The grid shall be suspended by means of galvanised steel L-section hangers at suitable centres, securely shot-pinned or screwed to concrete, steel or wood

Carried to Collection

R

Section: 2
Bill No. 9
CEILINGS, PARTITIONING AND ACCESS FLOORING
BTKM QUANTITY SURVEYORS

Descriptions shall be deemed to include any additional studs at ends and intersections, corner beads, cornices at junctions with ceilings, jointing compound, tape, etc.

New suspended ceiling consisting of galvanized steel members with aluminium facings - T38 Exposed Grid system with T38 (3600) main tees at 600mm centres, T38 (1200) at 1200mm centres SM 25 recessed wall angles and flush plaster trim sections for bulkheads, all with Vivid White finish and suspended with 2.5mm diameter galvanised wires not exceeding 1m, fixed to brandering or riveted to underside of concrete slabs with steel pop rivets. All strictly in accordance with manufacturer's specifications with 1200 x 600 x 12.5mm thick Vinyl covered Gypsum board lay-in tiles, white fissured finish

10	Vinyl clad gypsum board ceiling.	m2	4,391
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11	Vinyl clad fibre cement ceiling.	m2	431
----	----------------------------------	----	-----

CORNER PROTECTORS, ETC.

12	Pre-painted aluminium shadowline cornice	m	4,083
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13	75 x 75mm Aluminium corner protector 1500mm long fixed to wall	No	52
----	--	----	----

INSULATION

"Isotherm" or other similar approved thermal insulation with a minimum R-Value of 3.14

14	135mm Thermal insulation blanket 11.5kg/m ³ closely fitted and laid on top of brandering between roof timbers, 135mm Thermal insulation blanket 11.5kg/m ³ closely fitted and laid on top of brandering between roof timbers, etc.	m2	4,822
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Carried to Collection

R

Section: 2

Bill No. 9

CEILINGS, PARTITIONING AND ACCESS FLOORING

BTKM QUANTITY SURVEYORS

Section: 2
Bill No. 9
CEILINGS, PARTITIONING AND ACCESS FLOORING
COLLECTION

Total Brought Forward from Page No

**Page
No** **Amount**

71
72
73
74

Carried Forward to Summary of Section No: 2

R

Section: 2
Bill No. 9
CEILINGS, PARTITIONING AND ACCESS FLOORING
BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<p><u>SECTION 2</u></p> <p><u>BILL NO. 10</u></p> <p><u>FLOOR COVERINGS, WALL LININGS, ETC.</u></p> <p><u>PREAMBLES</u></p> <p>For Preambles refer to "Specification of Materials and Methods to be used PW 371"</p> <p><u>(HAYLETT FORMULA WORK GROUP NO. 130)</u></p> <p>NOTE : All materials shall be in colours to be selected by the Representative/Agent and, where applicable, laid to approved patterns</p> <p><u>SUPPLEMENTARY PREAMBLES</u></p> <p><u>Fixing</u></p> <p>Floor coverings, wall linings, etc shall, where applicable, be fixed with adhesive as recommended by the manufacturers of the flooring, linings, etc</p>			
<p>Carried to Collection</p>			R
<p>Section: 2</p> <p>Bill No. 10</p> <p>FLOOR COVERINGS, WALL LININGS, ETC.</p> <p>BTKM QUANTITY SURVEYORS</p>			

Surface preparation to be in accordance with flooring manufacturer and shall include removal of all cementitious nibs and ridges and all residual tile adhesive where existing vinyl flooring has been removed. Remove all debris and sweep and vacuum the whole floor area. Fill any surface imperfections with Pavelite, according to manufacturer. Check moisture content of subfloor and record results. Subfloor should be completely dry before commencing with installation. Sub-floor should be completely dry before commencing with installation.

Install floor sheeting with an approved pressure sensitive approved acrylic adhesive, spread with an approved notched trowel, spreading rate and open time.

Sheeting to be rolled out without trapping air bubbles or leaving gaps at seams. Remove any excess adhesive immediately. On completion floor to be rolled in both directions with a 3 segmental 68kg articulated roller, until sheets are adhered. Roll floor again between one and four hours later.

All joints to be butted, scribed and heat welded, ensuring that the welding rod adheres to at least 85% of sheet thickness. Completed weld should be trimmed in 2 stages, using a trimming guide to prevent the weld dishing and collecting dirt. Finished joints to be secure, smooth and hygienic.

4 Days after laying flooring, remove all debris and adhesive from flooring. Scrub floors with a neutral detergent complying with SABS 825 or later. Rinse with clean water and allow to dry completely. Apply 1 coat of an with an approved acrylic sealcote. Thereafter apply 2 coats sealer as above, each coat applied at right angles to the previous coat. The entire installation to be carried out by an approved specialist contractor. A test installation laid in a six-bed ward, or similar size area, must be carried out and approved by architect prior to continuing with installation. Colours according to the architect's instruction.

FLOOR COVERINGS

Carpets, etc.

Carried to Collection

R

Section: 2
Bill No. 10
FLOOR COVERINGS, WALL LININGS, ETC.
BTKM QUANTITY SURVEYORS

Approved 50cm x 50cm structured needlepunch carpet tile, manufactured from stainproof Polypropylene and Eco fibre blend, heavy commercial grading, with multi-layered backing. (Fibre mass 920g/m², total mass 3892g/m²). Total thickness 8mm. Product to be laid in accordance with the SANS fitting code of practice, in a tessalated pattern

1 On concrete or screeded floors

m2

569

Vinyl floor covering, etc.

Semi-flexible vinyl floor tiles manufactured to SABS specification 581 (or latest), laid in approved acrylic adhesive, spread with notched trowel having 1.5 x 1.5 x 1.5mm triangular notches at 4mm centres at the rate of between 5.5 to 6.5m² per litre.

Surface preparation to be in accordance with flooring manufacturer and shall include removal of all cementitious nibs and ridges and all residual tile adhesive where existing vinyl flooring has been removed. Remove all debris and sweep and vacuum the whole floor area. Fill any surface imperfections with approved filler material, according to manufacturer. Check moisture content of sub-floor and record results. Sub-floor should be completely dry before commencing with installation.

During the course of installation, the material must be rolled in both directions with a 3 segmental 68kg articulated roller.

3 Days after laying flooring, remove all debris and adhesive from flooring. Scrub floors with a neutral detergent complying with SABS 825 or latest. Rinse with clean water and allow to dry completely. Apply 3 coats of a water-based floor dressing, complying to SABS 1042 or latest. The entire installation to be carried out by an approved specialist contractor

2 Supply and install new approved 2,0mm vinyl as Polyflor Expona Flow PUR, or other similar approved, 2m wide Heterogeneous, non- directional, fully flexible, monolayer floor sheeting with a weight of not more than 2700g/m².

m2

4,099

Carried to Collection

R

Section: 2
Bill No. 10
FLOOR COVERINGS, WALL LININGS, ETC.
BTKM QUANTITY SURVEYORS

Section: 2

Bill No. 10

FLOOR COVERINGS, WALL LININGS, ETC.

COLLECTION

Total Brought Forward from Page No

**Page
No**

76

77

78

Amount

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 10

FLOOR COVERINGS, WALL LININGS, ETC.

BTKM QUANTITY SURVEYORS

-80-

5	Bathroom deadlock case dimension 102H x 78D forend dimensions (mm) 155H x 22W Backset 57mm	Sets	59
6	66mm Five pin Euro profile double cylinder master keyed.	No	225
<u>Handles</u>			
7	Aluminium 301C pull handle BT, fixed on a 75 x 170 x 1,2mm thick grade 430 stainless steel plate with no cylinder cut-out. Stainless steel plate to have 4 countersunk holes for screws	No	59
8	150mm Stainless steel barrel handle (Brushed satin finish)	No	744
9	Lever handle on 170 x 170mm plate wit cylinder cutout prepared for padlock	Sets	225
<u>STOPS, HOLDERS, HOOKS, ETC.</u>			
<u>Stainless steel</u>			
10	Floor mounted doorstop.	No	239
11	Buchel B2741 or other similar approved single anodised aluminium coathook with rubber doorstop	No	247
12	Two (2 No. off) hat and coat hooks fixed to 450 x 100 x 22mm thick hardwood rail, mounted to wall with 4 no. raised head screws	No	59
13	Five (5 No. off) hat and coat hooks fixed to 900 x 100 x 22mm thick hardwood rail, mounted to wall with 6 no. raised head screws	No	276
<u>BATHROOM FITTINGS</u>			
14	Lockable 18/10 Stainless steel (Satin finish) double toilet roll holder.	No	51
15	Wall mounted 18/10 stainless steel (Satin finish) soap dispenser.	No	81
16	Wall mounted 18/10 stainless steel (Satin finish) paper towel dispenser with anti-jamming device.	No	34

Carried to Collection

R

Section: 2
 Bill No. 11
 IRONMONGERY
BTKM QUANTITY SURVEYORS

"Chairman Industries cc" or similar approved

17	Three arm 460mm long wall mounted kitchen towel rail	No	6
18	800 x 80mm Flush valve back rail	No	3
19	300 x 300 x 300mm Side grab rail.	No	3
20	600mm long x 19mm Diameter Chromium plated towel rail, complete with closed end brackets fixed with 6mm chrome headed expansion bolts	No	179
21	32mm Stainless steel (Satin finish) corner shower rail	No	1
22	32mm "Ref SR2" centre flange slip resistant stainless steel back grab rail 750mm wide x 206mm deep, provided with 1 no. circular flange for bolting to wall	No	5
23	32mm "Ref DL3" stainless steel slip resistant side grab rail 900mm long, divided into 3 equal parts, bent twice at 45 degrees and provided with 3 no. circular flanges for bolting to wall	No	5

PELMETS AND CURTAIN TRACKS**"Narrow vertical blind system 90mm wide, plugged to brickwork or concrete**

24	Vertical blind size 600 x 900mm high, for face fixing, complete with rollers, brackets, stopped ends, etc. plugged	No	6
25	Ditto, but size 400 x 1800mm high	No	2
26	Ditto, but size 1200 x 1500mm high	No	12
27	Ditto, but size 1500 x 1500mm high	No	200
28	Ditto, but size 1500 x 2500mm high	No	3
29	Ditto, but size 1800 x 1200mm high	No	1
30	Ditto, but size 1800 x 1800mm high	No	11
31	Ditto, but size 2500 x 1500mm high	No	4
32	Ditto, but size 3000 x 1200mm high	No	1

Carried to Collection**R**

Section: 2
 Bill No. 11
 IRONMONGERY
BTM QUANTITY SURVEYORS

33	Ditto, but size 4000 x 2500mm high	No	8
<u>WRITING BOARDS, PROJECTION SCREENS, ETC</u>			
<u>"Vitrex system 2000" or other similar approved</u>			
34	Three piece standard wall mounted magnetic white board, overall size 1200 mm high x 1800 mm long, complete with aluminium pen rail, fixing components and secured in position to brickwork.	No	1
<u>Door closers, etc.</u>			
35	EN 2.4 Regular arm delayed action door closer: pull side fixing ENZ 750-850, EN 3 850-950, EN 4 950 -110	No	3
36	Hydraulic overhead surface mounting type door closer with aluminium casing adjustable for speed and power with hold-open function.	No	2
37	Non hold open cam action slide channel door closer with maximum door width 1100mm, closing force EN 2-4V with adjustable strength, hydraulic speed control and push side door	No	27
38	PHA micro switch	No	12
39	Two point locking panic bar for single door leaf 1000mm wide x 2270mm high (2201, 2104, PHX04)	Sets	12
40	Three point locking panic bar for double door leaf 1000mm wide x 2270mm high (2201, 2104, 2104, 2201, PHX04)	Sets	1
<u>SUNDRIES</u>			
41	3 x 40mm Aluminium cover strip between different floor finishes	m	150
42	3mm thick x 32mm wide clear perspex numeral plate reverse engraved and enamelled in two numerals and/or letters, twice countersunk holed for and screwed to door with chromium plated dome headed screws	No	8
43	3mm thick x 32mm wide clear perspex numeral plate reverse engraved and enamelled in three numerals and/or letters, twice countersunk holed for and screwed to door with chromium plated dome headed screws	No	14

Carried to Collection

R

Section: 2
Bill No. 11
IRONMONGERY
BTKM QUANTITY SURVEYORS

44	3mm thick x 60mm wide clear perspex numeral plate reverse engraved and enamelled in three numerals and/or letters to suit, twice countersunk holed for and tap screwed to steel gate framing with chromium plated dome headed self tapping screws	No	168
45	3mm thick x 32mm wide clear perspex name plate reverse engraved and enamelled in lettering to spell the word "KITCHEN", twice countersunk holed for and screwed to door with chromium plated dome headed screws	No	46
46	3mm thick x 32mm wide clear perspex name plate reverse engraved and enamelled in lettering to spell the word "PRINCIPAL", twice countersunk holed for and screwed to door with chromium plated dome headed screws	No	10
47	3mm thick x 32mm wide clear perspex name plate reverse engraved and enamelled in lettering to spell the word "PRINTROOM", twice countersunk holed for and screwed to door with chromium plated dome headed screws	No	16
48	3mm thick x 32mm wide clear perspex name plate reverse engraved and enamelled in lettering to spell the word "STAFF ROOM", twice countersunk holed for and screwed to door with chromium plated dome headed screws	No	4
49	3mm thick x 32mm wide clear perspex name plate reverse engraved and enamelled in lettering to spell the word "SICK ROOM 1", twice countersunk holed for and screwed to door with chromium plated dome headed screws	No	6
50	150 x 150mm Aluminium international toilet sign with MAN and/or WOMAN figure	No	26
51	Ditto, but disabled emblem	No	3
52	Approved white built-in type medicine cabinet size 375 x 600 x 100mm deep with mirror front and glass shelves and building in tiled or plastered wall including forming recess in brickwork and making good	No	8
<u>KITCHEN CUPBOARD UNITS</u>			
53	Sink unit 1350mm long with single bowl sink and drainer, one shelf and three doors	No	12
54	Bedroom vanity cupboard	No	168

Carried to Collection

R

Section: 2
Bill No. 11
IRONMONGERY
BTKM QUANTITY SURVEYORS

**PINNING BOARDS, WRITING BOARDS,
PROJECTION SCREENS, ETC**

55	600mm x 900mm Pinning Board supplied and fixed with aluminium frame and premier pinning surface	No	1
56	900mm x 1200mm Pinning Board supplied and fixed with aluminium frame and premier pinning surface.	No	220
57	900mm x 600mm Wall mounted whiteboard, complete with aluminium pen rail, supplied and fixed in position with brackets and screws as specified by manufacturer, with lower edge 1 000mm above finished floor level.	No	36
58	1500mm x 1000mm Wall mounted whiteboard, complete with aluminium pen rail, supplied and fixed in position with brackets and screws as specified by manufacturer, with lower edge 1000mm above finished floor level	No	4

PUSH PLATES, KICK PLATES, ETC.

59	Aluminium push plate size 150 x 75mm x 1,2mm stainless steel plate (AL5036-06AS)	No	59
60	300 x 900 x 1,2mm Thick grade 430 stainless steel kick plate fixed to wooden door.	No	22
61	170 x 170 x 1,2mm Thick grade 430 stainless steel plate with cylinder cut-out. Stainless steel plate to have 4 countersunk holes for screw fixing	No	225
62	200mm High x 813mm x 1,2mm thick stainless steel kick plate	No	118
63	300mm High x 813mm x 1,2mm thick stainless steel kick plate	No	3

SHELVING, ETC.

Proprietary type steel shelving with standard powder coated finish:

64	Double slot wall band 2200mm long plugged into brickwork	No	80
65	Shelf bracket for 400mm wide wrapped melamine shelf (timber shelf elsewhere).	No	400

Carried to Collection

R

Section: 2
Bill No. 11
IRONMONGERY
BTKM QUANTITY SURVEYORS

SHOWER DOORS, ETC.

- 66 Modular frameless cubicle system with overhead rail and hanging clamps with adjustable supporting feet, 12mm compact high pressure laminated board type panels and doors.complete with all fittings and ironmongery

No

30

Carried to Collection

R

Section: 2
Bill No. 11
IRONMONGERY
BTKM QUANTITY SURVEYORS

Section: 2

Bill No. 11

IRONMONGERY

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

80

81

82

83

84

85

86

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 11

IRONMONGERY

BTKM QUANTITY SURVEYORS

Item No		Quantity	Rate	Amount
<u>SECTION 2</u>				
<u>BILL NO. 12</u>				
<u>METALWORK</u>				
<u>PREAMBLES</u>				
For Preambles refer to "Specification of Materials and Methods to be used PW 371"				
<u>(HAYLETT FORMULA WORK GROUP NO. 136)</u>				
<u>THE FOLLOWING IN FRAMED AND WELDED MILD STEEL SUPPORTS FOR SEATING IN ENTRANCE HALL</u>				
1	40 x 40 x 1,6mm cold rolled angle section supports	kg	50	
2	50 x 50 x 3mm cold rolled angle section supports	kg	30	
3	Extra for mitred and welded angle	No	24	
4	Extra for cut and welded T-intersection	No	12	
5	Hole through 3mm steel for 8mm diameter bolt (elsewhere)	No	40	
6	M8 x 70mm expansion bolt	No	40	
7	200 x 200 x 3mm flat section triangular shaped gusset plate welded on between horizontal and vertical members of supports	No	25	
<u>PRESSED STEEL DOOR FRAMES</u>				
<u>1,2mm double rebated pressed steel door frames suitable for half brick walls</u>				
8	Door frame for door size 0,813 x 2,032m with two 100mm steel butts and slotted for lock strike	No	89	
Carried to Collection				R
Section: 2 Bill No. 12 METALWORK BTM QUANTITY SURVEYORS				

PRESSED STEEL DOOR FRAME SUNDRIES

9	Standard residential window section RFX7 as threshold welded on to pressed steel door frame	m	2
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ALUMINIUM

(HAYLETT FORMULA WORK GROUP NO. 140)

Aluminium windows, doors, etc.

Natural anodised aluminium windows glazed panels to be S10 solarshied with approved 6,38mm laminated safety glass fitted in existing steel frame, complete with 2 x side hung opening sections and three fixed

10	Window 600 x 900 mm high. (W6)	No	6
11	Window 1500 x 1500 mm high. (W1)	No	195
12	Window 1500 x 1800 mm high. (W3)	No	10
13	Window 1800 x 900 mm high (W5)	No	1

Natural anodised aluminium windows glazed panels to be S10 with approved 6,38mm laminated safety glass fitted in existing steel frame, complete with 1 x side hung opening sections and three fixed windowpane as indicated, all as per manufacturer

14	Window 1500 x 1200mm high. (W2)	No	12
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Natural anodised sliding aluminium windows glazed panels to be S10 with approved 6,38mm laminated safety glass fitted as indicated, all as per manufacturer

15	Window 1500 x 900 mm high. (W4)	No	2
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DOORS, ETC.

Standard bronze powdercoated aluminium single door with top light-6,5mm safety glass

16	Size 900 x 2100 mm high.	No	1
17	Size 915 x 2030 mm high.	No	1

Carried to Collection

R

Section: 2
Bill No. 12
METALWORK
BTKM QUANTITY SURVEYORS

	<u>Standard bronze powder coated aluminium double door with top light-6,5mm safety glass.</u>				
18	Size 1500 x 2530mm high.	No	12		
19	Size 1930 x 2295 mm high.	No	1		
<u>PRESSED STEEL TRANSFORMER ROOM DOORS AND FRAMES</u>					
<u>Durowin D.V. type or other similar approved</u>					
20	Steel transformer room unit with one shop coat red oxide, with door size 1524 x 2134mm high complete, to suite wall 230mm thick.	No	2		
<u>ALUMINIUM LOUVRE UNITS</u>					
<u>-WORK GROUP 140-</u>					
<u>Bronze anodised aluminium louvre units</u>					
21	1000 X 1700mm high bronze anodised aluminium louvres with insect screen	No	2		
<u>Sundries</u>					
<u>BURGLAR BARS, SECURITY GATES, ETC.</u>					
22	Security gate for door opening, size approximately 813 x 2032mm high consisting of 25,4 x 25,4 x 3mm thick square section gate framing with 2 horizontal bars filled in with 12 x 12mm solid vertical square bars, with and including outer frame formed of 50,8 x 76,2 x 2mm mild steel hollow section tube external framing, five (5 No.) times holed, size approximately 35mm diameter, for access to heavy duty steel expansion bolts into structure at 5 no. bolt fixings per stile at approximately 420mm c/c, including 1,5 pairs heavy duty purpose made external butt hinges per door leaf, all tick welded and grinded smooth	No	5		
23	Ditto for double leaf gate size 1200 x 2100mm high	No	1		
24	Ditto, for double door size 1784 x 2376, ditto.	No	6		
Carried to Collection					
Section: 2				R	
Bill No. 12					
METALWORK					
BTKM QUANTITY SURVEYORS					

Burglar bars consisting of 12 x 12mm horizontal and vertical square bar mild steel rails welded onto 32 x 32 x 3mm square tubing and fixed to wall with 12mm diameter x 80mm long steel dowels. Dowels to be tigged welded to outer frame and grind smooth

25	Burglar proofing size 600 x 900mm high	No	6
26	Ditto, size 1500 x 1500mm high	No	97
27	Ditto, size 1800 x 900mm high	No	5
28	Ditto, size 1500 x 1200mm high	No	6

STEEL, ERECTED AND FIXED IN POSITION COMPLETE

STEEL HANDRAILS, BALUSTRADES, ETC

Welded balustrade to external stairs

29	50 x 50 x 2,5mm Hollow section continuous pipe rails	m	94
30	50 x 50 x 2,5mm Hollow section balusters	m	187
31	30 x 30 x 2,5mm Hollow section balusters	m	624
32	Extra over 50 x 50 x 2,5mm hollow section for flat closed end	No	24
33	Extra over 50 x 50 x 2,5mm hollow section for L-intersection	No	12
34	Extra over 50 x 50 x 2,5mm hollow section for mitred L-intersection	No	12
35	Extra over 50 x 50 x 2,5mm hollow section for mitred irregular L-intersection	No	24
36	Extra over 50 x 50 x 2,5mm hollow section for T-intersection	No	12
37	Extra over 50 x 50 x 2,5mm hollow section for framed X-intersection	No	12
38	Extra over 50 x 50 x 2,5mm hollow section for irregular T-intersection	No	12
39	Hole through 2,5mm steel for bolt	No	240

Carried to Collection

Section: 2
Bill No. 12
METALWORK
BTKM QUANTITY SURVEYORS

R

40	10mm M10 expansion bolt	No	240
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**THE FOLLOWING IN FIXING OF LIGHT
STEEL ROOF TRUSSES**

41	40 x 40 x 3mm Angle section 180mm long bedded in non-shrink grout and fixed to ring beam with 2 x Hilty HUS3-H screw anchor or other similar approved, minimum 75mm deep in concrete beam	No	2,500
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THE FOLLOWING IN BENCH SEATS

The following in welded framing for slatted benches in block B

42	32 x 32 x 2,5mm Hollow section in framework welded	m	18
43	Extra over 32 x 32 x 2,5mm hollow section in framework for mitred and welded right angle intersection	No	21
44	Extra over 32 x 32 x 2,5mm hollow section in framework for mitred and welded acute angle intersection	No	14
45	Drill hole through 32 x 32 x 2,5mm hollow section	No	14
46	Extra over 32 x 32mm hollow section framework for not exceeding 32mm diameter PVC capping	No	14

Carried to Collection

Section: 2
Bill No. 12
METALWORK
BTKM QUANTITY SURVEYORS

R

Section: 2
Bill No. 12
METALWORK
COLLECTION

Total Brought Forward from Page No

Page No	Amount
88	
89	
90	
91	
92	

Carried Forward to Summary of Section No: 2

Section: 2
Bill No. 12
METALWORK
BTKM QUANTITY SURVEYORS

R

Item No		Quantity	Rate	Amount
	<u>SECTION 2</u>			
	<u>BILL NO. 13</u>			
	<u>PLASTERING</u>			
	<u>PREAMBLES</u>			
	For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
	<u>(HAYLETT FORMULA WORK GROUP NO. 142)</u>			
	<u>SUPPLEMENTARY PREAMBLES</u>			
	<u>GRANOLITHIC</u>			
	<u>Method</u>			
	The method to be used shall be either the monolithic method or the bonded method			
	<u>Preparation</u>			
	For granolithic applied monolithically, the concrete floor shall be swept clean after bleeding of the concrete has ceased and the slab has begun to stiffen; any remaining bleed water shall be removed and the granolithic applied immediately thereafter. For granolithic to be bonded to the floor slab after it has hardened, the slab surface shall be hacked (preferably by mechanical means) until all laitance, dirt, oil, etc is dislodged and swept clean of all loose matter. The slab shall then be wetted and kept damp for at least six hours before applying the granolithic			
	<u>Mix</u>			
	Granolithic shall attain a compressive strength of at least 41MPa. The coarse aggregate shall comply with SANS 1083 and shall generally be capable of passing a 10mm mesh sieve. Where the thickness of the granolithic exceeds 25mm, the size of the coarse aggregate shall be increased to the maximum size compatible with the thickness of the granolithic			
	Carried to Collection		R	
	Section: 2 Bill No. 13 PLASTERING BTKM QUANTITY SURVEYORS			

Panels

Granolithic shall be laid in panels not exceeding 14m² for monolithic finishes, not exceeding 9,5m² for bonded finishes and not exceeding 6m² for all external granolithic. Wherever possible, panels shall be square but at no time should the length of the panel exceed 1,5 times its width

Where possible joints between panels shall be positioned over joints in the floor slab and shall be at least 3mm wide through the full thickness of the finish, separated by strips of wood or fibreboard and finished with V-joints

Laying

Monolithic granolithic shall be applied to the partially set slab and thoroughly compacted and lightly wood floated to the required levels

Bonded granolithic shall be applied to the slab after applying a 1:1 sand-and-cement slurry brushed over the surface and allowed to partially set before applying the granolithic. The granolithic shall be thoroughly compacted and lightly wood floated to the required levels

After wood floating, the monolithic and bonded granolithic shall remain undisturbed until bleeding has ceased and the surface has stiffened. Any remaining bleed water and laitance shall then be removed and the surface steel trowelled or power floated

Curing, seasoning and protection

Granolithic shall be covered with clean hessian with waterproof building foil over and kept wet for at least seven days after laying

Colour

Coloured granolithic shall be tinted with an approved colouring pigment mixed into a true and even colour

SCREEDSCEMENT SCREEDS TO CONCRETE

Carried to Collection

R

Section: 2

Bill No. 13

PLASTERING

BTKM QUANTITY SURVEYORS

	<u>23mm thick</u>				
1	On floors to receive vinyl floor tiles (elsewhere)	m2	45		
	<u>12mm POLYESTER SCREED (4 COMPONENT TYPE)</u>				
2	On kitchen floors with and including preparation of existing floor below	m2	160		
	<u>INTERNAL PLASTER</u>				
	<u>NEW PLASTER</u>				
	<u>ONE COAT (4:1) CEMENT PLASTER FINISHED TO A SMOOTH AND EVEN STEEL TROWELLED SURFACE</u>				
	<u>On brickwork</u>				
3	On walls	m2	50		
4	On narrow widths	m2	2		
	<u>On concrete</u>				
5	On walls	m2	30		
	<u>ONE COAT (3:1) CEMENT PLASTER FINISHED TO A SMOOTH AND EVEN STEEL TROWELLED SURFACE</u>				
	<u>On concrete</u>				
6	On ceilings	m2	12		
Carried to Collection					R
Section: 2					
Bill No. 13					
PLASTERING					
BTM QUANTITY SURVEYORS					

Section: 2
Bill No. 13
PLASTERING
COLLECTION

Total Brought Forward from Page No

Page
No

Amount

94
95
96

Carried Forward to Summary of Section No: 2

R

Section: 2
Bill No. 13
PLASTERING
BTKM QUANTITY SURVEYORS

	Quantity	Rate	Amount
<p><u>SECTION 2</u></p> <p><u>BILL NO. 14</u></p> <p><u>TILING</u></p> <p><u>PREAMBLES</u></p> <p>For Preambles refer to "Specification of Materials and Methods to be used PW 371"</p> <p><u>(HAYLETT FORMULA WORK GROUP NO. 144)</u></p> <p><u>SUPPLEMENTARY PREAMBLES</u></p> <p><u>Fixing</u></p> <p>Unless described as "fixed with adhesive to plaster (plaster elsewhere)" descriptions of tiling on brick or concrete walls, columns, etc shall be deemed to include 1:4 cement plaster backing and descriptions of tiling on concrete floors etc shall be deemed to include 1:3 plaster bedding</p> <p>Tiling described as "fixed with adhesive on power floated concrete" shall be deemed to include for approved tiling key-coat</p> <p>Unless otherwise specified, the screed shall consist of approved rapid drying cement and sand mixed in proportions not richer than 1:30 nor leaner than 1:4 by weight when based on dry sand. Sand must be well graded, clean, sharp and free of fines, clays and organic material. The screed shall be wood floated, allowed to cure for a minimum of 24 hours and then be clean, free of laitance or any other contaminants, dry, firm and stable when tiling commences.</p> <p>Ceramic, porcelain, marble and granite tiles are to be fixed and grouted with suitable adhesives and grouts from the "Tal Professional" ("Ceresit Tylon") range of products as recommended by the manufacturer of the tiles</p>			
<p>Carried to Collection</p>			R
<p>Section: 2 Bill No. 14 TILING BTKM QUANTITY SURVEYORS</p>			

F CERAMIC TILES

Approved 1st Grade 330 x 330mm x 8mm Ceramic floor tiles. Installation of tiles must be according to the manufacturers' specifications and must conform to the Code Of Practice For The Installation of Ceramic Wall & Floor Tiles (SABS 0107 or latest).

Tiling to be installed by an approved tiling contractor.

F CARPET TILES WITH BACKING

Approved 50cm x 50cm structured needlepunch carpet tile, manufactured from stainproof Polypropylene and Eco fibre blend, heavy commercial grading, with multi-layered backing. (Fibre mass 920g/m², total mass 3892g/m²). Total thickness 8mm. Product to be laid in accordance with the SANS fitting code of practice, in a tessalated pattern.

F NON-SLIP CONCRETE (APRON / WALKWAYS)

Prepare area, install wire mesh and cast concrete beds (minimum 85mm thick) in panels - wood floated finish

F EPOXY PAINT

Epoxy paint finish to floor - prepare surface and paint approved 2 part epoxy paint. Where non-slip areas are required, an approved silica mix is to be used in the product. All to be prepared and applied as per manufacturer's specifications.

F STOEP ENAMEL PAINT

Single pack, alkali resistant enamel for interior and exterior use. All to be prepared and applied as per manufacturer's specifications.

F BROADLOOM CARPET

Approved 3.66m Wide, broadloom structured needlepunch carpet (resinback), manufactured from stainproof Polypropylene and Eco fibre blend, heavy commercial grading. Total thickness 7mm. Laid on a clean surface by approved contractor, on approved underfelt. Product to be laid in accordance with the SANS fitting code of practice.

Carried to Collection

R

Section: 2

Bill No. 14

TILING

BTKM QUANTITY SURVEYORS

F PORCELAIN TILES

300 x 300 x 8mm Grade 1, full body Salt and Pepper porcelain tiles fixed with approved tile adhesive to concrete floors and flush pointed with tinted waterproof jointing compound, laid in accordance with SABS 0107 or latest fitting code of practice work to be executed by an approved tiling contractor. Colours as per architect on site.

PORCELAIN TILES

152 x 152 x 5mm White glazed ceramic tiles (Allow R180/m2) fixed with adhesive to plaster and flush pointed with tinted waterproof jointing compound. Work to be executed by an approved tiling contractor.

1	On walls in isolated panels, splashbacks, etc.	m2	230
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CERAMIC TILES

Approved 1ST Grade 330 x 330mm x 8mm Ceramic floor tiles (Allow R250/m2). Installation of tiles must be according to the manufacturers' specifications and must conform to the Code Of Practice For The Installation of Ceramic Wall & Floor Tiles (SABS 0107 or latest). Tiling to be installed by an approved tiling contractor.

2	On floors, etc.	m2	297
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3	On walls, etc	m2	203
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4	On narrow widths.	m2	9
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200 x 400mm Glazed grade 1 ceramic wall tiles (Allow R250/m2). Tile adhesive and method of application, as per manufacturer's specification. 3mm Wide joints to be grouted with white epoxy grouting 4 days after tiling.

5	On walls, etc.	m2	1,426
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6	On narrow widths.	m2	16
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SUNDRIES

Carried to Collection

R

Section: 2

Bill No. 14

TILING

BTKM QUANTITY SURVEYORS

Section: 2
Bill No. 14
TILING

BTKM QUANTITY SURVEYORS

Section: 2

Bill No. 14

TILING

COLLECTION

Total Brought Forward from Page No

**Page
No**

Amount

98

99

100

101

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 14

TILING

BTKM QUANTITY SURVEYORS

Item No		Quantity	Rate	Amount
	<u>SECTION 2</u>			
	<u>BILL NO. 15</u>			
	<u>PLUMBING AND DRAINAGE</u>			
	<u>PREAMBLES</u>			
	For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
	<u>(HAYLETT FORMULA WORK GROUP NO. 148)</u>			
	<u>GUTTERS, DOWNPIPES, ETC</u>			
	<u>0,6mm Galvanised sheet iron Class Z 275</u>			
1	100 x 125mm Rectangular section eaves gutter with 20mm wide overlapping joints sealed with and including "Compriband" or other approved sealing strip and riveted at 20mm centres	m	50	
2	Extra for stopped end	No	10	
3	Extra for outlet with nozzle for and jointed to 75mm diameter galvanised sheet iron downpipe including galvanised wire balloon grating	No	10	
4	75mm diameter rainwater downpipe with brackets fixed to brick wall or concrete	m	35	
5	Extra for shoe	No	10	
6	Extra for eaves offset	No	10	
	<u>SANITARY FITTINGS</u>			
	<u>DOUBLE CENTRE BOWL DROP-IN SINK</u>			
7	1500 x 500mm Double Centre Bowl stainless steel drop-in sink unit, as supplied by Franke (Citimetal) Product Code: 1990008, or other similar approved.	No	2	
	Carried to Collection			
	Section: 2			
	Bill No. 15			
	PLUMBING AND DRAINAGE			
	BTKM QUANTITY SURVEYORS			
			R	

NEW WASH HAND BASIN

- 8 Vitreous china 630 x 500mm rectangular "Concorde 630" basin, or similar approved, with three semi-punched tapholes (i.e. available in zero, one, two or three taphole configurations), integrated overflow, bolted to the wall using two 10mm bolts (code 8448Z0), complete with plug and chain and silicone sealant between basin and wall. (Taps elsewhere measured). Colour: white.

No

4

WASH HAND BASIN COUNTER TOP

- 9 Vitreous china 595 x 455mm, oval self rimming vanity basin with tap hole and overflow & with chain stay hole. Seal basin to counter top with silicone sealant. (White)

No

195

WC: VITREOUS CHINA TOILETS

- 10 VITREOUS CHINA 104 degree outlet wash down pan with enlarged pedestal and matching 9 litre cistern complete with white, solid toilet seat and matching lid. (White.)

No

48

- 11 TOILET FOR DISABLED PEOPLE (Cistern) Vitreous china paraplegic floor mounted toilet with 90 degree outlet pan and matching 9 litre cistern, complete with purpose-made C.P. side-flush lever mounted on wall adjacent to cistern (Left or Right).

No

3

VITREOUS CHINA URINALS

- 12 Vitreous china wall mounted urinal with top inlet. Overall size 610mm x 385mm. Supplied with 38mm C.P. Domical Grating, C.P. spreader, hanger brackets, fitted with exposed Flushmaster valve and urinal chromium plated flushpipe. (White.)

No

15

- 13 URINAL (Corner): Vitreous china corner wall mounted urinal with top inlet. Overall size 610mm x 385mm. Supplied with 38mm C.P. Domical Grating, C.P. spreader, hanger brackets, fitted with exposed Flushmaster valve and urinal chromium plated flushpipe. (White.)

No

2

VITREOUS CHINA BASINS

Carried to Collection

R

Section: 2

Bill No. 15

PLUMBING AND DRAINAGE

BTKM QUANTITY SURVEYORS

**STAINLESS STEEL "FRANKE" OR OTHER
SIMILAR APPROVED FITTINGS**

14	(DOUBLE WASHTROUGH) 1030 x 430mm Franke (Citimetal), or similar approved, model ET102 double bowl washtrough, manufactured in grade 403 (17.0) stainless steel, fixed to wall with two 19mm square mild steel gallows brackets complete with 40mm ø waste outlet, plug and chain.	No	2
15	HEAVY DUTY STAINLESS STEEL BASIN Franke Surround Wall Mount Basin, or similar approved, 390x320x250 mm with a 150mm splash back manufactured from Grade 304 (18/10) Stainless Steel 1.2mm gauge in a satin finish. The unit has a pressed bowl 360x280x140mm deep and a polished outer casing with a 40 degree angled base with an inspection panel with security screws. Unit complete with a 40mm perforated waste outlet. Basin supplied with four 8mm x 650mm long galvanised mild steel treaded rods for fixing through the wall. Unit also to include Walcro 155UWS Metering Basin Valve 408937 and Walcro BBD/15 Basin Spout 420896	No	1

TESTING

16	Provide all necessary apparatus water, etc. for and test the whole of the Sanitary Plumbing and Water Supply installation to the satisfaction of the Representative/Agent and Municipality, replace any defective work free of charge and leave perfect		Item
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STAINLESS STEEL FITTINGS

17	Lockable 18/10 stainless steel (satin finish) double toilet roll holder complete with screws and plugs, installed as per manufacturer's instructions. Positions to be confirmed on site	No	51
18	Wall mounted soap dispenser (18/10 stainless steel – satin finish). Including screws and plugs. To be fixed as per manufacturer's specifications in position as indicated by architect on site.	No	79
19	Wall mounted paper towel dispenser (18/10 stainless steel – satin finish) with anti-jamming device. Including screws and plugs. To be fixed as per manufacturer's specifications in position as indicated by architect on site.	No	33

Carried to Collection

R

Section: 2
Bill No. 15
PLUMBING AND DRAINAGE
BTKM QUANTITY SURVEYORS

**TRAPS, ETC. INCLUDING JOINTS TO SEAL
PIPE AND/OR FITTINGS UNLESS OTHERWISE
DESCRIBED**

20	40mm 360 Bottle trap	No	216
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TAPS, VALVES, ETC.

21	Single hole mixer- single lever (pillar) Cobra Noka: NA-951 or other similar approved single lever basin mixer	No	195
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22	Single hole mixer (pillar) "Cobra Stella Bright-3294SB" or other similar approved	No	1
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23	One pair 15mm Chromium plated elbow action pillar taps as by "Cobra Stella Bright-3309SB-15" or other similar approved with and including 40mm waste, plug, stay and chain	No	3
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24	"Cobra" Shower set: 3328SB026-065, or other similar approved consisting of tap head-part complete P-63-2SB, tap pair of handles C-HA-ST BR.1/2"light patten tap washer C-098-15, shower arm 026, Shower head 065 and stop tap sliding wall flange C-FL30X1.	No	32
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25	40mm 373 RB shower trap with chromium plated grating	No	32
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26	15mm Ballostop valve	No	416
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27	22mm Gate valve	No	36
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28	400mm Long CP service connection	No	449
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SANITARY PLUMBING

SV Pipes

29	50mm Pipes	m	370
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30	110mm Pipes	m	160
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Extra over uPVC pipes for fittings

31	50mm Bend	No	24
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32	50mm Access bend	No	107
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Carried to Collection

R

Section: 2

Bill No. 15

PLUMBING AND DRAINAGE

BTKM QUANTITY SURVEYORS

33	50mm Junction	No	56
34	110mm Bend	No	12
35	110mm Access bend	No	15
36	110mm Junction	No	48
37	110mm Access junction	No	15
38	110mm Access reducing junction	No	12
39	110mm Pan connector	No	51
40	110mm Bend with anti-syphon horn	No	51
41	110mm "GI Two-way" vent valve	No	51

uPVC gulleys

42	110mm Dished gulley not exceeding 500mm deep, complete	No	8
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WATER SUPPLY

Class 1 thin wall hard drawn copper pipes and fittings with capillary soldered type connections

43	15mm pipes fixed in walls, ceilings, roofs, floors, etc.	m	1,580
44	22mm pipes fixed in walls, ceilings, roofs, floors, etc.	m	960

Extra over class 1 copper pipes for soldered capillary fittings

45	15mm fittings	No	1,450
46	22mm fittings	No	315

TESTING

47	Provide all necessary apparatus water, etc for and test the whole of the Sanitary Plumbing and Water Supply installation to the satisfaction of the Representative/Agent and Municipality, replace any defective work free of charge and leave perfect	Item	
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Carried to Collection

R

Section: 2
Bill No. 15
PLUMBING AND DRAINAGE
BTKM QUANTITY SURVEYORS

**BUILDER'S WORK, INCLUDING ALL
MAKING GOOD**

MASONRY

**(HAYLETT FORMULA WORK GROUP NO.
116)**

48 Fair cutting and fitting of facings around pipe not exceeding
100mm diameter

No

1

PAINTING

**(HAYLETT FORMULA WORK GROUP NO.
152)**

**Prepare, prime with a self-etching primer and
paint one undercoat and one coat of high gloss
enamel paint**

49 On galvanised mild steel pipe not exceeding 300mm girth

m

75

Carried to Collection

R

Section: 2
Bill No. 15
PLUMBING AND DRAINAGE
BTKM QUANTITY SURVEYORS

Section: 2
Bill No. 15
PLUMBING AND DRAINAGE
COLLECTION

Total Brought Forward from Page No

Page No	Amount
103	
104	
105	
106	
107	
108	

Carried Forward to Summary of Section No: 2

Section: 2
Bill No. 15
PLUMBING AND DRAINAGE
BTKM QUANTITY SURVEYORS

R

Item No		Quantity	Rate	Amount
	<u>SECTION 2</u>			
	<u>BILL NO. 16</u>			
	<u>GLAZING</u>			
	<u>PREAMBLES</u>			
	For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
	<u>(HAYLETT FORMULA WORK GROUP NO. 150)</u>			
	<u>GLAZING TO STEEL WITH PUTTY</u>			
	<u>3mm Clear float glass</u>			
1	Panes exceeding 0,1m² and not exceeding 0,5m²	m2	5	
	<u>4mm Clear float glass</u>			
2	Panes exceeding 0,5m² and not exceeding 2m²	m2	12	
	<u>Mirrors</u>			
	Mirrors shall be of 6mm thick silvered GG quality polished float glass with rounded and polished edges and splayed corners. Unless otherwise described, mirrors shall be with four holes for and screwed to and including approved patent plugs in plastered or tiled wall with countersunk steel screws tap-threaded for and including screw type chromium plated dome-headed caps and felt washers			

3	Mirror size 600 x 900mm	No	6	
4	Mirror size 1200 x 800mm	No	178	
	Carried Forward to Summary of Section No: 2		R	
	Section: 2			
	Bill No. 16			
	GLAZING			
	BTKM QUANTITY SURVEYORS			

Item No	Quantity	Rate	Amount
<u>SECTION 2</u>			
<u>BILL NO. 17</u>			
<u>PAINTING</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
<u>(HAYLETT FORMULA WORK GROUP NO. 152)</u>			
<u>PREPARATORY WORK TO EXISTING WORK</u>			
<u>Previously painted plastered surfaces</u>			
Surfaces shall be thoroughly washed down and allowed to dry completely before any paint is applied. Blistered or peeling paint shall be completely removed and cracks shall be opened, filled with a suitable filler and finished smooth			
<u>Previously painted metal surfaces</u>			
Surfaces shall be thoroughly rubbed and cleaned down. Blistered or peeling paint shall be completely removed down to bare metal			
<u>Previously painted wood surfaces</u>			
Surfaces shall be thoroughly cleaned down. Blistered or peeling paint shall be completely removed and cracks and crevices shall be primed, filled with suitable filler and finished smooth			
<u>PAINTWORK TO PREVIOUSLY PAINTED WORK</u>			
<u>PAINT ON PLASTER, ETC</u>			
Carried to Collection			R
Section: 2 Bill No. 17 PAINTWORK BTKM QUANTITY SURVEYORS			

<u>Epoxy paint finish to floor - prepare surface and paint approved 2 part epoxy paint. Where non-slip areas are required, an approved silica mix is to be used in the product. All to be prepared and applied as per manufacturer's specifications</u>				
1	On internal concrete floors/screeds	m2	10	
2	Concrete cupboard floors	m2	200	
<u>Prepare, stop and paint one coat alkali resistant primer and two full coats acrylic emulsion paint for interior use</u>				
3	On internal plastered walls	m2	9,816	
4	Ditto, in narrow withs n.e. 300mm wide	m2	108	
<u>Prepare, stop and paint one coat alkali resistant primer and two full coats acrylic emulsion paint for exterior use</u>				
5	On internal plastered ceilings, soffits, etc.	m2	65	
<u>Prepare, stop, paint all screw heads with flat oil paint, apply one coat alkali resistant primer and two full coats acrylic emulsion paint for exterior use</u>				
6	On external fibre cement fascias and bargeboards, etc.	m2	40	
<u>Prepare, stop and paint one coat alkali resistant primer, one coat universal undercoat and two coats external weather resistant paint</u>				
7	On external walls, etc.	m2	2,945	
8	Ditto, in narrow withs n.e. 300mm wide	m2	108	
<u>PAINT ON METAL</u>				
<u>Prepare, touch up factory primer, paint one coat zinc chromate primer, one undercoat and two full coats high gloss enamel paint</u>				
9	On pressed steel door frames	m2	70	
10	On strongroom doors and frames	m2	60	
Carried to Collection				
Section: 2				
Bill No. 17				
PAINTWORK				
BTKM QUANTITY SURVEYORS				

11	On grille gates and screens (both sides measured on flat)	m2	80
12	On bars, rods, etc. not exceeding 300mm girth	m	624
<u>PAINT ON WOOD</u>			
<u>Prepare and apply one coat wood primer</u>			
13	On cornices, coverstrips, etc. not exceeding 300mm girth	m	85
<u>Prepare, stop and apply two coats polyurethane clear eggshell varnish, lightly sanded down between coats</u>			
14	On general surfaces of fittings	m2	150
15	On general surfaces of fittings not exceeding 300mm girth	m	382
<u>Prepare, stop and apply three coats polyurethane clear eggshell varnish, lightly sanded down between coats</u>			
16	On general surfaces	m2	54
17	On batten doors (measured on flat)	m2	16
<u>Prepare and paint one coat hardboard primer, one undercoat and two full coats high gloss enamel paint</u>			
18	On general surfaces	m2	156
19	On cupboard doors (Both sides measured)	m2	1,481
<u>PAINT ON FIBRE-CEMENT, TERRA-COTTA, ETC.</u>			
<u>Prepare, sand down and apply one coat universal undercoat and two coats high gloss enamel paint</u>			
20	On external window sills, etc. not exceeding 300mm girth	m	330
21	On internal fibre-cement internal window sills not exceeding 300mm girth.	m	330

PAINTWORK ETC TO NEW WORK

ON PLASTER

Carried to Collection

Section: 2
Bill No. 17
PAINTWORK
BTKM QUANTITY SURVEYORS

R

	<u>Prepare, stop and paint one coat alkali resistant primer and two full coats acrylic emulsion paint for interior use</u>				
22	On internal plastered walls	m2	52		
	<u>Prepare, stop and paint one coat alkali resistant primer and two full coats acrylic emulsion paint for exterior use</u>				
23	On internal plastered ceilings	m2	20		
	<u>Prepare, stop, paint all screw heads with flat oil paint, apply one coat alkali resistant primer and two full coats acrylic emulsion paint for exterior use</u>				
24	On external fibre cement fascias and bargeboards	m2	30		
	<u>Prepare, stop and paint one coat alkali resistant primer, one coat universal undercoat and two coats eggshell enamel paint</u>				
25	On internal plastered walls	m2	93		
26	On external fibre cellulose board ceilings including priming nail heads with one coat zinc chromate primer	m2	36		
	<u>ON CONCRETE</u>				
	<u>Prepare, stop and paint two coats Duraflex or similar approved to approval of the engineer.</u>				
27	Smooth concrete surfaces of staircases.	m2	289		
	<u>PAINT ON FIBRE-CEMENT, TERRA-COTTA, ETC.</u>				
28	On fascia's bargeboards, etc.	m2	11		
	<u>PAINT ON METAL</u>				
	<u>Prepare and apply two coats bitumen paint</u>				
29	On inside of 100 x 125mm galvanised sheet iron eaves gutter before fixing	m	50		
Carried to Collection					R
Section: 2					
Bill No. 17					
PAINTWORK					
BTKM QUANTITY SURVEYORS					

Prepare, touch up factory primer, paint one coat zinc chromate primer, one undercoat and two full coats high gloss enamel paint

30	On pressed steel door frames	m2	3
31	On strongroom doors and frames	m2	18
32	On grille gates and screens (both sides measured on flat)	m2	80
33	On bars, rods, etc. not exceeding 300mm girth	m	250

Prepare, touch up factory primer, apply one coat zinc chromate primer, one universal undercoat and two coats eggshell enamel paint

34	On pressed steel trap door and frame	m2	6.0
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Scrub with galvanised iron cleaner, rinse with clean water, paint one coat zinc-chromate primer, one undercoat and two full coats high gloss enamel paint

35	On galvanised gutters, downpipes, etc.	m2	26
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PAINT ON WOOD

Prepare and apply one coat wood primer

36	On cornices, coverstrips, etc. not exceeding 300mm girth	m	65
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Prepare, stop and apply two coats polyurethane clear eggshell varnish, lightly sanded down between coats

37	On general surfaces of fittings	m2	465
38	On skirtings, rails, etc. not exceeding 300mm girth	m	3,626
39	On general surfaces of fittings not exceeding 300mm girth	m	130

Prepare, stop and apply three coats polyurethane clear eggshell varnish, lightly sanded down between coats

40	On general surfaces	m2	85
41	On batten doors (measured on flat)	m2	13

Carried to Collection

R

Section: 2
Bill No. 17
PAINTWORK
BTKM QUANTITY SURVEYORS

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Section: 2

Bill No. 17

PAINTWORK

COLLECTION

Total Brought Forward from Page No

**Page
No**

Amount

111

112

113

114

115

116

Carried Forward to Summary of Section No: 2

R

Section: 2

Bill No. 17

PAINTWORK

BTKM QUANTITY SURVEYORS

Bill No	SECTION SUMMARY - Section No 2: Builders Work	Page No	Amount
1	ALTERATIONS	44	
2	PILING	50	
3	PRECAST CONCRETE	51	
4	CONCRETE, FORMWORK AND REINFORCEMENT	56	
5	MASONRY	60	
6	WATERPROOFING	61	
7	ROOF COVERING, ETC.	62	
8	CARPENTRY AND JOINERY	70	
9	CEILINGS, PARTITIONING AND ACCESS FLOORING	75	
10	FLOOR COVERINGS, WALL LININGS, ETC.	79	
11	IRONMONGERY	87	
12	METALWORK	93	
13	PLASTERING	97	
14	TILING	102	
15	PLUMBING AND DRAINAGE	109	
16	GLAZING	110	
17	PAINTWORK	117	
Carried to Final Summary			R
Section: 2			
BTKM QUANTITY SURVEYORS			

SECTION 3
GENERAL SITE WORKS

Item No	Quantity	Rate	Amount
<u>SECTION 3</u>			
<u>BILL NO. 1</u>			
<u>GENERAL SITE WORKS</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
<u>(HAYLETT FORMULA WORK GROUP NO. 104)</u>			
NOTE : All excavations are measured as being in "earth" and/or filling compacted to 98% modified AASHTO density. Descriptions of excavations shall be deemed to include for setting aside surplus excavated material in spoil heaps for use as filling or for depositing within 150m of the perimeter of the excavations and spreading and roughly levelling as directed, as well as for increase in bulk and multiple handling of excavated material caused by the contractor's method of operation. Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site and for bulking.			
<u>DEMOLITIONS, ETC.</u>			
1	Carefully take down and remove existing timber guardhouse complete not exceeding 25m2.	Item	
2	Breaking up and removing tar surface and removing from site.	m2	3,950
3	Ditto, but existing block paving.	m2	1,050
<u>EARTHWORKS</u>			
4	Clear the grass area, etc. on site to be built upon including the removal of small shrubs and trees with a trunk not exceeding 200mm girth measured 1m above ground level.	m2	245
Carried to Collection			R
Section: 3			
Bill No. 1			
GENERAL SITE WORKS			
BTKM QUANTITY SURVEYORS			

REMOVAL OF TREES ETC

5	Take out and remove tree with trunk exceeding 200mm and not exceeding 500mm girth measured 1m above ground level including excavating and removing of roots and fill hole with clean dry earth filling, watered and rammed.	No	1
6	Take out and remove tree with trunk exceeding 500mm and not exceeding 1m girth measured 1m above ground level including excavating and removing of roots and fill hole with clean dry earth filling, watered and rammed.	No	2
7	Take out and remove tree with trunk exceeding 1m and not exceeding 1,5m girth measured 1m above ground level including excavating and removing of roots and fill hole with clean dry earth filling, watered and rammed.	No	1

Pruning of existing trees and shrubs

8	Digging up and removing rubbish, debris, vegetation, hedges, shrubs and trees not exceeding 200mm girth, bush, etc. for a width of 2m wide.	m2	250
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BULK EXCAVATION, FILLING, ETC

Open face excavation in earth over sloping site and depositing excavated material in prescribed stock piles on site.

9	Open face excavations in earth to reduced levels.	m3	130
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Extra over all excavations for carting away

10	Extra over all excavations for carting away surplus material from excavations and/or stockpile on site to a dumping site to be located by the Contractor.	m3	130
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THE FOLLOWING IN WATER TANK STAND AND TANK

THE FOLLOWING IN TANK PLATFORM

All steel to be galvanised as by SANS 121. Steel to be GRD S355JR. Steel work to comply with SANS 10160 and 10162-1. Design wind pressure - 1,00 kPa. All bolts to be grade 8.8

11	305 x 102 x 33 I-section parallel flange	t	2.55
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Carried to Collection

R

Section: 3
Bill No. 1
GENERAL SITE WORKS
BTKM QUANTITY SURVEYORS

12	305 x 102 x 25 I-section parallel flange	t	0.55
13	406 x 140 x 46 I-section parallel flange	t	0.90
14	406 x 140 x 46 I-section parallel flange	t	0.45
15	60 x 60 x 6mm Angle section	kg	210
16	125 x 75 x 8mm Angle section	kg	275
17	Expanded metal type VEM487/17M	m2	109
<u>Sundries</u>			
18	350 x 350 x 30mm Baseplate with four x 28mm diameter holes for four M24 high tensile bolts	No	12
19	100 x 100 x 12mm Thick steel washers	No	12
20	100 Projection with 25mm thick grout bedded in with chamfered edge around base plate	No	12
<u>The following in handrail</u>			
21	Two rail heavy duty mild steel system HS/IA/L stanchions at 1,5m centres complete with hand and knee rails welded to 150 x 50 x 10mm thick base plates under each stanchions	m	43
22	Extra for bends	No	8
23	Extra for T-intersections	No	64
24	Extra for closed ends	No	4
<u>THE FOLLOWING IN TANK STAND (TO BE DESIGNED, MANUFACTURED AND ERECTED BY AN APPROVED SPECIALIST)</u>			
25	152 x 152 x 37mm H-section column	t	0.74
26	100 x 100 x 8mm Angle section	kg	1,391
27	90 x 90 x 8mm Angle section in braces	kg	1,243
28	80 x 80 x 6mm Angle section in braces	kg	520

Carried to Collection

Section: 3
Bill No. 1
GENERAL SITE WORKS
BTKM QUANTITY SURVEYORS

R

29	Cat ladder consisting of M20mm Rings at 390mm centres	m	21
30	12mm Cap plate fixed with 4 x M20 grade 8.8 bolts	m	42
<u>THE FOLLOWING IN LANDING</u>			
31	180 x 70mm Beams	t	0.11
32	80 x 80 x 6mm Angle section in braces	kg	22
33	3050 x 850mm Landing	m2	3
34	M20mm High tensile bolts with heads, nuts and washers	No	80

THE FOLLOWING IN TANK

Tanks are manufactured from standard panels 1220 x 1220 mm. All stays, rubber gaskets, sealants, bolts and nuts required to assemble a watertight tank to be included.

Cover plates to form a roof over the tank must be provided with one lockable access manhole 450 x 450 mm with built-in screened vent per compartment.

Tanks over 1,22 m deep must be supplied with one internal ladder per compartment and one external ladder.

All tanks to be provided with one level indicator per compartment. Pipe connection points must be welded to the tank plates in positions specified by the engineer. Four connection points up to 150 mm NB per compartment must be included in the price.

35	229m3 Galvanised watertank bolted together and constructed on top of 20m high stand	Item
<u>Sundries</u>		
36	Scaffolding/crane hire for placing of tank stand and tank itself, etc.	Item
37	As built drawings for tank and stand to approval of the Engineer	Item

Carried to Collection

R

Section: 3
Bill No. 1
GENERAL SITE WORKS
BTKM QUANTITY SURVEYORS

Section: 3

Bill No. 1

GENERAL SITE WORKS

COLLECTION

Total Brought Forward from Page No

**Page
No**

Amount

119

120

121

122

Carried Forward to Summary of Section No: 3

R

Section: 3

Bill No. 1

GENERAL SITE WORKS

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<u>SECTION 3</u>			
<u>BILL NO. 2</u>			
<u>STORMWATER DRAINAGE, SOIL DRAINAGE AND WATER SUPPLY</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
<u>(HAYLETT FORMULA WORK GROUP NO. 146)</u>			
NOTE : All excavations are measured as being in "earth" and/or filling compacted to 98% modified AASHTO density -----			
<u>STORMWATER DRAINAGE</u>			
<u>EARTHWORKS</u>			
1	Excavate in earth not exceeding 2m deep for storm water channels, aprons, etc.	m3	20
2	Compaction of ground surface under aprons, etc. including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compact to 93% modified AASHTO density.	m2	131
<u>Carting away, etc.</u>			
3	Extra over all excavations for carting away surplus material from excavations and/or stockpile on site to a dumping site to be located by the Contractor.	m3	20
<u>EARTH FILLING SUPPLIED BY THE CONTRACTOR</u>			
Carried to Collection			R
Section: 3 Bill No. 2 STORMWATER, SOIL DRAINAGE AND WATER SUPPLY BTKM QUANTITY SURVEYORS			

Fill of G6 material in accordance with SABS 1200DM compacted in 150mm layers to 95% Mod AASHTO density to approval of engineer.

4	Under stormwater channels, aprons, etc.	m3	20
5	Tests to determine the degree of compaction, etc. of ground or filling.	No	10
6	Poisoning surface of ground in bottoms of trenches, bases, etc	m2	131

CONCRETE

(HAYLETT FORMULA WORK GROUP NO. 110)

MESH REINFORCED CONCRETE

7	V-shaped channel 1500mm wide x 150mm thick with rounded salient edges and finished on exposed surfaces with 2:1 cement mortar, laid to falls in panels not exceeding 1,8m long with 12mm bitumen impregnated softboard movement joints with exposed edges, raked out for a depth of 10mm and filled with bituminous compound including all necessary excavations and formwork	m	87
8	Extra for fair open end	No	2
9	Extra for fair stopped end	No	3
10	Extra for angle intersection	No	13
11	Extra for T-intersection	No	1
12	Triangular shaped concrete spill basin size 1,1m at head, 2,4m at base end and 1,192m along the sides, formed of 200mm thick concrete base with concrete upstand size 200 x 200mm high along two sides and 200 x 200mm footing along base end including all excavations, formwork and backfilling, the top of the base inlaid with eleven clay bricks protruding 55mm above the surface of the concrete and loose stones of 100 to 150mm diameter loose at the base of the spill basin for a width of 500mm	No	1

(HAYLETT FORMULA WORK GROUP NO 114)

Carried to Collection

R

Section: 3
Bill No. 2
STORMWATER, SOIL DRAINAGE AND WATER SUPPLY
BTKM QUANTITY SURVEYORS

REINFORCEMENT

Mesh reinforcement

- | | | | | |
|----|---|----|-----|--|
| 13 | Mesh reinforcement with mesh reference number 193 laid in surface beds, etc. with 300mm wide side and end laps (measured net) | m2 | 131 | |
|----|---|----|-----|--|

CONCRETE SUNDRIES

Finishing top surfaces of concrete smooth with a wood float

- | | | | | |
|----|--|----|-----|--|
| 14 | Finish raking top surface of concrete aprons to a smooth and even wood floated surface including additional dry sand/cement mixture added as necessary whilst the concrete is still wet | m2 | 131 | |
| 15 | Finish raking top surface of surface bed to a smooth and even non-slip wood float surface including additional dry sand/cement mixture added as necessary whilst the concrete is still wet | m2 | 2 | |
| 16 | Finish edge of concrete slabs, etc. not exceeding 300mm high to a smooth and even steel floated surface including additional dry sand/cement mixture added as necessary whilst the concrete is still wet including rounded corner along top edge | m | 93 | |

Movement joints

- | | | | | |
|----|--|---|-----|--|
| 17 | Movement joint not exceeding 300mm high formed of 12mm bitumen impregnated softboard placed vertical in position between concrete stormwater channel and brick walls or concrete aprons, etc including raking out top section 10mm deep and filling with bituminous compound | m | 116 | |
|----|--|---|-----|--|

FORMWORK

(HAYLETT FORMULA WORK GROUP NO. 111)

- | | | | | |
|----|--|----|----|--|
| 18 | Formwork to edges, risers, ends, etc, not exceeding 300mm high or wide | m | 93 | |
| 19 | Permanent formwork formed of 6mm fibre cement boarding to soffit of surface bed over rainwater channel | m2 | 4 | |

Carried to Collection

R

Section: 3
Bill No. 2
STORMWATER, SOIL DRAINAGE AND WATER SUPPLY
BTKM QUANTITY SURVEYORS

20	Surface beds, slabs, etc to falls	m2	131
<u>THE FOLLOWING IN PAVED CHANNELS, ETC.</u>			
<u>PRECAST CONCRETE</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 112)</u>			
21	60mm Thick precast concrete interlocking block paving bedded in concrete (elsewhere measured) with joints filled in with sand and cement mixture including all straight cutting	m2	87
22	Extra over for bedding sides to 1:3 slope	m	180
<u>MASS CONCRETE</u>			
<u>Mass concrete with a coarse aggregate of 19mm and a minimum compressive strength of 15MPa at 28 days</u>			
23	In 1930mm wide concrete bedding below stormwater channel	m3	2
<u>SOIL DRAINAGE</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 146)</u>			
<u>uPVC class 34 pipes</u>			
24	110mm Pipes laid in and including trenches not exceeding 1m deep	m	13
25	160mm Ditto.	m	43
26	160mm Ditto, exceeding 1m and not exceeding 1,5m deep	m	73
27	160mm Ditto, exceeding 2m and not exceeding 3m deep	m	14
28	160mm Ditto, exceeding 3m and not exceeding 4m deep	m	37
<u>Extra over uPVC class 34 pipes for fittings</u>			
29	160mm Access bend	No	2

Carried to Collection

R

Section: 3
Bill No. 2
STORMWATER, SOIL DRAINAGE AND WATER SUPPLY
BTKM QUANTITY SURVEYORS

30	160mm Access junction	No	2
31	160mm Reducing junction	No	1

THE FOLLOWING IN PRE-FABRICATED MANHOLES

Pre-fabricated concrete manholes shall be as Drainage details D10D and constructed according to the Manufacturer's instructions. All manholes to be out of dolomitic aggregate

Excavate in earth for and including circular type precast concrete manhole formed of 1,2m diameter x 100mm thick 20MPa/19mm mass concrete bottom with manhole shaft formed of 1,05m diameter (internal) precast concrete rings with joints sealed with "Denso" or other similar approved sealing strip with and including precast concrete cover slab 125mm thick and precast concrete spacer slab with opening for and including lockable concrete lid as by "Rocla" or other similar approved set in cement mortar and sealed in tallow and with fine mass concrete benching in bottom floated smooth with falls to and including 110mm UPVC channels and finished on all exposed surfaces with 25mm thick granolithic with angles rounded including all necessary step irons, etc.

32	Manhole not exceeding 1m deep	No	3
33	Manhole exceeding 1m and not exceeding 1,5m deep	No	2
34	Manhole exceeding 1,5m and not exceeding 2m deep	No	2
35	Manhole exceeding 2m and not exceeding 2,5m deep	No	2
36	Manhole exceeding 2,5m and not exceeding 3,5m deep	No	1

Carried to Collection

Section: 3
Bill No. 2
STORMWATER, SOIL DRAINAGE AND WATER SUPPLY
BTKM QUANTITY SURVEYORS

R

Sundries

- | | | | |
|----|--|----|---|
| 37 | Hole through side of precast concrete manhole for pipe exceeding 100mm and not exceeding 200mm diameter and inserting channel junction and make good concrete benching, etc. | No | 3 |
|----|--|----|---|

Repair existing manhole with 100mm thick 20MPa/19mm mass concrete bottom with manhole with plastered shaft with joints sealed with bituminous putty with and including precast concrete cover slab 125mm thick and precast concrete spacer slab with opening for and including heavy duty road type manhole cover and frame as type 4 set in cement mortar to approval of the Engineer.

- | | | | |
|----|-------------------------------|----|---|
| 38 | Manhole not exceeding 1m deep | No | 1 |
|----|-------------------------------|----|---|

STORMWATER CHANNELS

Prefabricated culverts

- | | | | |
|----|--|----|---|
| 39 | Excavation for prefabricated culverts, etc and working spaces of 0.5 m all round: includes disposal of material, keeping excavation safe and dealing with water. | m3 | 5 |
|----|--|----|---|

Precast concrete pipe culverts

- | | | | |
|----|---|---|----|
| 40 | 300mm Diameter Class 100D concrete pipes with interlocking joints bedded in B granular bedding or type A concrete bedding | m | 15 |
|----|---|---|----|

Precast concrete box culverts

- | | | | |
|----|---|---|---|
| 41 | Rectangular portal culvert units Class C laid on fine bedding material size 600 x 450mm high to approval of the Engineer. | m | 3 |
|----|---|---|---|

WATER SUPPLY

(HAYLETT FORMULA WORK GROUP NO. 148)

Carried to Collection

R

Section: 3
Bill No. 2
STORMWATER, SOIL DRAINAGE AND WATER SUPPLY
BTKM QUANTITY SURVEYORS

<u>Water connection</u>				
42	Connection of new waterline to existing with and including possible excavations, fittings, backfilling, etc. to approval of the engineer.	No	4	
<u>Galvanised mild steel screwed and socketed pipes and fittings</u>				
43	20mm Pipe in short lengths in connections	m	4	
44	20mm Pipe and excavations not exceeding 1m deep	m	55	
45	25mm Pipe and excavations not exceeding 1m deep	m	30	
46	Extra over 20mm pipe for fittings	No	12	
47	Extra over 25mm pipe for fittings	No	8	
<u>HDPE polyethelene Class 12 piping with "Plasson" or other approved fittings</u>				
48	25mm Pipe and excavations not exceeding 1m deep	m	75	
49	63mm Pipe and excavations not exceeding 1m deep	m	120	
<u>Extra over polyethylene pipes for fittings</u>				
50	25mm Fittings	No	14	
51	63mm Elbow	No	4	
52	63mm Tee	No	2	
53	63 x 50mm Rreducing tee	No	2	
54	63mm Male adaptor coupling	No	2	
<u>Valves, etc including joints to pipes and/or fittings</u>				
55	25mm Brass fullway wheel valve	No	8	
56	63mm Brass fullway wheel valve	No	4	
Carried to Collection				R
Section: 3				
Bill No. 2				
STORMWATER, SOIL DRAINAGE AND WATER SUPPLY				
BTKM QUANTITY SURVEYORS				

uPVC Class 9 water pipes

57	110mm Pipes laid in and including trenches not exceeding 1m deep	m	897
58	110mm Bend	No	44
59	110mm T-junction	No	10
60	110mm Non-return valve	No	2
61	110mm Control valve	No	11

SUNDRIES**(HAYLETT FORMULA WORK GROUP NO. 148)**

62	Excavate in earth for and build stop cock box size 225 x 225 x 600mm deep internally with half brick sides in cement mortar with 225 x 225mm regulation pattern cast iron hinged box Type 11B set in and including 15MPa/19mm mass concrete surround size 75mm wide x 100mm deep all round	No	2
63	Extra over excavations in earth for pipe trenches, etc for excavations in soft rock	m3	1
64	Extra over excavations in earth for pipe trenches, etc for excavations in hard rock	m3	1
65	15MPa/19mm Mass concrete in thrust blocks around fittings including necessary additional excavations, formwork, etc	m3	1

TESTING

66	Supply all the necessary apparatus, water etc. for and test the soil drainage and water supply systems to the satisfaction of the Representative/Agent and the Local Authority, rectify all defective work free of charge and leave in perfect order	Item	
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Carried to Collection

R

Section: 3

Bill No. 2

STORMWATER, SOIL DRAINAGE AND WATER SUPPLY

BTKM QUANTITY SURVEYORS

Section: 3

Bill No. 2

STORMWATER, SOIL DRAINAGE AND WATER SUPPLY

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

124

125

126

127

128

129

130

131

Carried Forward to Summary of Section No: 3

R

Section: 3

Bill No. 2

STORMWATER, SOIL DRAINAGE AND WATER SUPPLY

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<u>SECTION 3</u>			
<u>BILL NO. 3</u>			
<u>PARKING AND PAVING</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
NOTE : All excavations are measured as being in "earth" and/or filling compacted to 98% modified AASHTO density -----			
<u>EARTHWORKS</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 104)</u>			
1	Open face excavations in earth to reduce levels	m3	1,304
2	Extra over all excavations for carting away surplus material from excavations and/or stockpile on site to a dumping site to be located by the Contractor	m3	1,304
3	Extra over open face excavations in earth for excavations in soft rock	m3	15
4	Extra over open face excavations in earth for excavations in hard rock	m3	5
5	Allow for keeping all excavations entirely free from water and mud	Item	
6	150mm sub-base layer of selected earth filling from the excavations stabilised with and including 5% road lime and compacted to 93% modified AASHTO density	m3	869
7	125mm base layer of selected gravel material to comply with minimum CBR 15 and maximum PI 12, imported from commercial sources and compacted to 95% modified AASHTO density	m3	565
Carried to Collection			R
Section: 3 Bill No. 3 PARKING AND PAVING BTKM QUANTITY SURVEYORS			

8	Compaction of ground surface under pavings, etc including scarifying for a depth of 150mm, breaking down over size material, adding suitable material where necessary and compact to 93% modified AASHTO density	m2	4,345
9	25mm thick layer clean, dry, riversand layer treated with an approved weed killer at the rate of 50 gram per square metre, spread and levelled to receive paving blocks (elsewhere)	m2	4,345
10	Tests to determine the degree of compaction, etc. of ground or filling	No	40
11	Poisoning surface of ground in bottoms of trenches, bases, etc	m2	4,345

PRECAST CONCRETE

(HAYLETT FORMULA WORK GROUP NO. 112)

12	60mm Thick precast concrete interlocking block paving laid to falls on sand layer (elsewhere) with joints filled in with sand including all straight cutting	m2	4,345
13	Semi vertical kerbing to SABS 927 Fig. 3 in 1m lengths with 10mm wide butt joints filled in with cement mortar and pointed with grooved half round joints and 10mm wide open butt joints at 5m centres including 15MPa/19mm mass concrete bedding size 50mm thick x 300mm wide and 20MPa/19mm mass concrete haunching size 225mm long x 225mm high x 150mm thick at joints and backfilling at back of kerbs, top soiled and levelled to adjacent surfaces	m	400
14	Ditto figure 8b, ditto.	m	350

PAINTING

(HAYLETT FORMULA WORK GROUP NO. 152)

ROAD MARKING

Prepare and paint one coat white reflective road marking paint on precast concrete paving blocks

15	100mm wide line	m	250
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Carried to Collection

R

Section: 3
Bill No. 3
PARKING AND PAVING
BTKM QUANTITY SURVEYORS

Section: 3
Bill No. 3
PARKING AND PAVING
BTKM QUANTITY SURVEYORS

Section: 3

Bill No. 3

PARKING AND PAVING

COLLECTION

Total Brought Forward from Page No

Page
No

133

134

135

Amount

Carried Forward to Summary of Section No: 3

R

Section: 3

Bill No. 3

PARKING AND PAVING

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<u>SECTION 3</u>			
<u>BILL NO. 4</u>			
<u>WALKWAYS AND YARD WALLS</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
NOTE : All excavations are measured as being in "earth" and/or filling compacted to 98% modified AASHTO density -----			
<u>THE FOLLOWING IN BOUNDARY WALLS</u>			
<u>DEMOLITIONS, ETC.</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 102)</u>			
<u>Carefully break down and remove existing prefabricated wall with flat wrap/barbed wiring to top, consisting of concrete panels, uprights with concrete footings, pole caps, etc. All holes to be filled up with imported filling and re-compacted to 93% mod AASHTO density in 150mm layers</u>			
1	Prefabricated fence 2400mm high extreme	m	747
2	Ditto, but one brick wall 2m high with and including removal of concrete foundation, ditto.	m	23
<u>Removal of steel gates complete with and including corner posts, concrete footing, ect. and filling up holes with G6 gravel material compacted in 150mm layers to 90% mod AASHTO density.</u>			
3	Steel gate 6000mm wide x 2000mm high	No	4
<u>EARTHWORKS</u>			
Carried to Collection			R
Section: 3			
Bill No. 4			
WALKWAYS AND BOUNDARY WALLS, ETC.			
BTKM QUANTITY SURVEYORS			

(HAYLETT FORMULA WORK GROUP NO. 104)

4	Excavate in earth not exceeding 2m deep for surface trenches	m3	614
5	Ditto, for column bases.	m3	264
6	Compaction of ground surface under column bases, etc including scarifying for a depth of 300mm, breaking down oversize material, adding suitable material where necessary and compact to 93% modified AASHTO density	m2	269
7	Excavate in imported filling (elsewhere measured) not exceeding 2m deep for column bases	m3	46
8	Ditto, for strip footings.	m3	259

Carting away, etc.

9	Extra over all excavations for carting away surplus material from excavations and/or stockpile on site to a dumping site to be located by the Contractor	m3	878
10	Extra over all excavations in G6 for carting away surplus G6 material from excavations and stockpile on site.	m3	183

Rock excavations

11	Extra over excavations in earth for trenches and holes for excavations in soft rock	m3	87
12	Extra over excavations in earth for trenches and holes for excavations in hard rock	m3	43

Sundries

13	Risk of collapse of sides of excavations for trenches and holes from natural, elevated or reduced ground level to not exceeding 1,5m deep	m2	889
14	Allow for keeping all excavations entirely free from water and mud		Item

EARTH FILLING SUPPLIED BY THE CONTRACTOR

Carried to Collection

R

Section: 3
Bill No. 4
WALKWAYS AND BOUNDARY WALLS, ETC.
BTKM QUANTITY SURVEYORS

Fill of G6 material in accordance with SABS 1200DM compacted in 150mm layers to 95% Mod AASHTO density to approval of engineer.

15	Backfilling column bases, etc.	m3	81
16	Backfilling from the excavations to trenches and holes compacted to 90% modified AASHTO density	m3	122
17	Tests to determine the degree of compaction, etc. of ground or filling	No	20
18	Poisoning surface of ground in bottoms of trenches, bases, etc	m2	896

CONCRETE

(HAYLETT FORMULA WORK GROUP NO 110)

Reinforced concrete with a coarse aggregate of 38mm and a minimum compressive strength of 20MPa at 28 days

19	In footings to walls cast against excavated surfaces, stepped and levelled	m3	95
20	In column bases cast against excavated surfaces	m3	17

REINFORCEMENT

(HAYLETT FORMULA WORK GROUP NO 114)

High tensile steel reinforcement to structural concrete work

21	16mm Bars.	t	5.00
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MASONRY

(HAYLETT FORMULA WORK GROUP NO. 116)

Brickwork in clay bricks in cement mortar

22	One brick wall in foundations	m2	321
23	One brick wall in superstructure	m2	1,606

Carried to Collection

R

Section: 3
Bill No. 4
WALKWAYS AND BOUNDARY WALLS, ETC.
BTKM QUANTITY SURVEYORS

<u>Movement joints</u>				
24	DOW Corning 813C sealant or other similar approved, between brickwork and metal surfaces	m	2,020	
<u>Joint forming material in movement joints</u>				
25	12mm Fibre board built in vertically through brick walls	m2	935	
<u>Brickwork reinforcement</u>				
26	150mm Wide reinforcement built in horizontally	m	5,976	
<u>"Roan Satin" FBX or other similar approved face bricks to Architect's specifications, pointed with square recessed horizontal and vertical joints</u>				
27	Extra over ordinary brickwork for facing and pointing in stretcher bond in foundations. (Both sides measured)	m2	388	
28	Ditto, in superstructure. (Both sides measured)	m2	3,212	
29	Face brick-on-edge coping on top of one brick wall in cement mortar and pointing on top and both sides	m	747	
<u>IRONMONGERY</u>				
<u>(HAYLETT FORMULA WORK GROUP NO. 132)</u>				
30	63mm brass five pin tumbler padlock with two keys	No	8	
<u>STEEL COLUMNS AND BEAMS</u>				
<u>Welded columns in single lengths with flat section base plates bolted to concrete columns and welded onto beams and treated with primer before installation</u>				
31	254 x 146 x 31kg/m I-Section column including baseplate cast vertically in concrete base. (Elsewhere measured)	t	15.65	
32	254 x 146mm x 6mm Thick Capping plate welded to top of I-Beam	No	187	
Carried to Collection				R
Section: 3				
Bill No. 4				
WALKWAYS AND BOUNDARY WALLS, ETC.				
BTKM QUANTITY SURVEYORS				

33	300 x 200 x 6mm thick baseplate welded to bottom of 254 x 146 x 31kg/m I-Section beam with and including 15mm non-shrink grout with and including 4 x 14mm diameter holes for anchors. (Elsewhere measured)	No	187
34	4 x M12 Hilti HSA stud anchor with a minimum of 65mm embedded depth, 120mm long in total with head, nuts and washers.	No	748
<u>The following in barbed wire on top of gates and wall</u>			
NOTE : Flat wrap razor security wire to comply with CKS 592 specification. Flat wrap wire and clips to be Aluzink coated -----			
35	Flat wrap razor coil security wire in 500mm diameter vertical loops fixed with wire ties to and including three rows of 5mm diameter barbed straining wires fastened to angle iron brackets (elsewhere) at top of wall or gate frame	m	747
<u>Prepare, touch up factory primer, paint one coat zinc chromate primer, one undercoat and two full coats high gloss enamel paint</u>			
36	Paint to steel overhangs n.e. 300mm girth	m	874
37	65 x 65 x 6mm Angle iron bracket 2300mm long extreme fixed at 2000mm centres to wall, the top triangular section 1050mm above wall x 220mm wide at base section, three times drilled for straining wire and twice drilled for and bolted to wall with and including M12mm expansion bolts 50mm long	No	255

Carried to Collection

R

Section: 3
Bill No. 4
WALKWAYS AND BOUNDARY WALLS, ETC.
BTKM QUANTITY SURVEYORS

THE FOLLOWING IN STEEL SLIDING GATES, ETC.

- 38 Steel sliding gate size 7860mm long x 1825mm high extreme, constructed of 60 x 60 x 3,5mm thick hollow section divided in three sections by two vertical 60 x 60 x 3,5mm thick vertical sections, filled in with 40 x 40 x 3mm devilsfork angle sections welded on 100mm centres with and including 100 x 100 x 3,5mm thick gate support poles (Eight) cast into 300 x 800 and 800 x 800 x 400mm deep concrete footings connected to top with and including six roller wheels to top for 40 x 40mm angle section guide rail. The gate to be provided with four 100mm diameter wheels welded on. Concrete footing to be 400mm wide by 400mm deep consisting of 16mm rod welded on 120mm IPE section, the above welded to rebar lugs bend to Engineers specification and approval. Total length of concrete with sliding section to be 15m long with and including stop end. All excavations, rebar, steel, concrete, etc. must be approved by the engineer before the contractor may proceed to the next stage.

No

3

(HAYLETT FORMULA WORK GROUP NO. 136)

THE FOLLOWING IN WALKWAYS, ETC.

EARTHWORKS

EXCAVATIONS ETC:

EXCAVATIONS IN EARTH, EXISTING GRAVEL FILLING UNDER SOLID FLOORS, ETC, BELOW THE NATURAL OR REDUCED LEVELS AS DESCRIBED:

(HAYLETT FORMULA WORK GROUP NO. 104)

EXCAVATION, FILLING, ETC.

Excavation in earth not exceeding 2 m deep

- 39 Bases, etc. not exceeding 2m deep.

m3

27

- 40 Topsoil, etc. ditto

m3

62

Carried to Collection

R

Section: 3

Bill No. 4

WALKWAYS AND BOUNDARY WALLS, ETC.

BTKM QUANTITY SURVEYORS

Extra over trench and hole excavations in earth for excavation in:

41	Soft rock	m3	7
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42	Hard rock	m3	4
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Extra over trench and hole excavations in earth for breaking up and removing of:

43	Reinforced concrete in existing bases	m3	4
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Extra over all excavations for carting away:

44	Surplus material from the excavations to a dumping site to be located by the contractor.	m3	89
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Risk of collapse of excavations:

45	Sides of trenches and holes excavations from ground level to not exceeding 1,5m deep.	m2	181
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Keeping excavations free of water:

46	Allow for keeping all excavations free from water and mud.		Item
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Compaction of surfaces:

47	Compaction of ground surface in bases, etc. including scarifying for a depth of 150mm, breaking down over size material, adding suitable material where necessary and compact to 93% modified AASHTO density	m2	45
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48	Ditto, under walkways	m2	178
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EARTHWORKS

Coarse river sand filling supplied by the contractor

49	25mm Thick layer clean, dry, riversand layer treated with an approved weed killer at the rate of 50 gram per square metre, spread and levelled to receive paving blocks (elsewhere)	m2	178
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50	Extra over for brick on flat edge 200 x 50mm grey paving bricks, laid in stock pattern on and including 200mm wide x 150mm deep mass concrete footing including all necessary excavations, etc.	m	259
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Carried to Collection

R

Section: 3

Bill No. 4

WALKWAYS AND BOUNDARY WALLS, ETC.

BTKM QUANTITY SURVEYORS

G6 Earth filling supplied by the contractor compacted to 98% Mod AASHTO density

51	150mm Imported G6 sub-base layer in trenches compacted to 93% modified AASHTO density	m3	22
52	Ditto under floors compacted in 150mm layers to a total thickness of 500mm	m3	89

SOIL POISONING:**Soil insecticide:**

53	Chlordane or other approved termite poison under bases, floors, aprons, ramps, steps, pavings, etc including forming and poisoning shallow furrows against foundation walls etc, filling in furrows and ramming	m2	178
54	Tests to determine the degree of compaction, etc. of ground or filling	No	20

CONCRETE, FORMWORK AND REINFORCEMENT**SUPPLEMENTARY PREAMBLES:****Note:**

The attention of tenderers is drawn to the fact that very stringent control measures will apply in respect of the quality of all concrete ingredients

Cost of tests:

The costs of making, storing and testing of concrete test cubes as required under clause 7 "Tests" of SABS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the representative/agent. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the representative/agent. (Test cubes are measured separately)

Carried to Collection

R

Section: 3

Bill No. 4

WALKWAYS AND BOUNDARY WALLS, ETC.

BTKM QUANTITY SURVEYORS

**REINFORCED CONCRETE CAST AGAINST
EXCAVATED SURFACES**

25 Mpa/19mm Reinforced concrete in:

55	Bases, etc.	m3	27
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TEST BLOCKS:

56	Making and testing 150 x 150 x 150mm concrete strength test cube	No	50
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PRECAST CONCRETE

(HAYLETT FORMULA WORK GROUP NO. 112)

57	50mm Thick precast concrete bevel block paving in herringbone pattern laid to falls on sand layer (elsewhere) with joints filled in with sand including all straight cutting	m2	180
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58	Semi vertical kerbing to SABS 927 Fig. 7 in 1m lengths with 10mm wide butt joints filled in with cement mortar and pointed with grooved half round joints and 10mm wide open butt joints at 5m centres including 15MPa/19mm mass concrete bedding size 50mm thick x 300mm wide and 20MPa/19mm mass concrete haunching size 225mm long x 225mm high x 150mm thick at joints and backfilling at back of kerbs, top soiled and levelled to adjacent surfaces	m	254
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(HAYLETT FORMULA WORK GROUP NO. 136)

Carried to Collection

R

Section: 3
Bill No. 4
WALKWAYS AND BOUNDARY WALLS, ETC.
BTKM QUANTITY SURVEYORS

Section: 3

Bill No. 4

WALKWAYS AND BOUNDARY WALLS, ETC.

COLLECTION

Total Brought Forward from Page No

**Page
No**

Amount

137
138
139
140
141
142
143
144
145

Carried Forward to Summary of Section No: 3

R

Section: 3

Bill No. 4

WALKWAYS AND BOUNDARY WALLS, ETC.

BTKM QUANTITY SURVEYORS

Item No		Quantity	Rate	Amount
	<u>SECTION NO 3</u>			
	<u>BILL NO 5</u>			
	<u>CARPORTS, ETC.</u>			
	<u>PREAMBLES</u>			
	For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
	<u>SUPPLEMENTARY PREAMBLES:</u>			
	<u>NOTE:</u> All excavations are measured as being in "earth" and/or filling compacted to 98% modified AASHTO density.			
	<u>DEMOLITIONS, ETC.</u>			
1	Carefully take down and remove existing rusted steel carports with and including support poles cast in concrete. Excavated areas to be filled with imported G6 material and compacted in 150mm layers at 97% mod AASHTO density to adjacent level to engineer's approval	m2	840	
	<u>EARTHWORKS</u>			
	<u>EXCAVATIONS ETC:</u>			
	<u>EXCAVATIONS IN EARTH, EXISTING GRAVEL FILLING UNDER SOLID FLOORS, ETC. BELOW THE NATURAL OR REDUCED LEVELS AS DESCRIBED:</u>			
	<u>(HAYLETT FORMULA WORK GROUP NO. 104)</u>			
	<u>EXCAVATION, FILLING, ETC OTHER THAN BULK:</u>			
	<u>Excavation in earth not exceeding 2 m deep</u>			
2	Column bases, etc.	m3	56	
	Carried to Collection		R	
	Section: 3 Bill No. 5 CARPORTS, CANOPIES, ETC. BTKM QUANTITY SURVEYORS			

<u>Extra over trench and hole excavations in earth for excavation in:</u>				
3	Soft rock	m3	6	
4	Hard rock	m3	5	
<u>Extra over trench and hole excavations in earth for breaking up and removing of:</u>				
5	Reinforced concrete in existing bases	m3	6	
<u>Extra over all excavations for carting away:</u>				
6	Surplus material from the excavations to a dumping site to be located by the contractor.	m3	56	
<u>Risk of collapse of excavations:</u>				
7	Sides of trenches and holes excavations from ground level to not exceeding 1,5m deep.	m2	188	
<u>Keeping excavations free of water:</u>				
8	Allow for keeping all excavations free from water and mud.		Item	
<u>Compaction of surfaces:</u>				
9	Compaction of ground surface under bases, etc including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 90% Modified AASHTO density.	m2	86	
<u>G6 Earth filling supplied by the contractor compacted to 98% Mod AASHTO density</u>				
10	In column bases	m3	50	
<u>SOIL POISONING:</u>				
<u>Soil insecticide:</u>				
11	Chlordane or other approved termite poison under bases, floors, aprons, ramps, steps, pavings, etc including forming and poisoning shallow furrows against foundation walls etc, filling in furrows and ramming	m2	186	
Carried to Collection				R
Section: 3				
Bill No. 5				
CARPORTS, CANOPIES, ETC.				
BTKM QUANTITY SURVEYORS				

CONCRETE (EXCLUDING FORMWORK)

(HAYLETT FORMULA WORK GROUP NO. 104)

REINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES

25 Mpa/19mm Reinforced concrete in:

12	Column bases	m3	30
13	Stub columns, etc.	m3	2

REINFORCED CONCRETE IN SUPERSTRUCTURE

25 Mpa/19mm Reinforced concrete in:

14	Thickening of floor under half brick walls	m	3
15	450 x 450mm Square columns approximately 3100mm high	m3	4
16	Concrete beams, etc. cast on top of pile caps	m3	2
17	Floors, etc.	m3	2

TEST BLOCKS:

18	Making and testing 150 x 150 x 150mm concrete strength test cube	No	5
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FORMWORK, ETC

ROUGH FORMWORK (DEGREE OF ACCURACY II):

Rough formwork to sides of:

19	Stub columns, etc.	m2	22
20	Edges, risers, ends and reveals not exceeding 300mm wide or high	m	18

SMOOTH FORMWORK (DEGREE OF ACCURACY II):

Carried to Collection

Section: 3
Bill No. 5
CARPORTS, CANOPIES, ETC.
BTKM QUANTITY SURVEYORS

R

Smooth formwork to sides of:

21	Ground beams, etc.	m2	15
22	450 x 450mm Square columns in superstructure.	m2	33
23	Stub columns, etc. not exceeding 300mmm wide	m	18

REINFORCEMENT

Fabric reinforcement

24	Type 193 fabric reinforcement in concrete surface beds, slabs, etc	m2	14
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Mild steel reinforcement to structural concrete work

25	10mm Diameter bars	t	0.03
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High tensile steel reinforcement to structural concrete work

26	16mm Diameter bars	t	0.02
27	12mm Diameter bars	t	0.01

MASONRY

STRUCTURAL STEELWORK

SUPPLEMENTARY PREAMBLES:

Descriptions:

Descriptions of bolts shall be deemed to include nuts and washers

Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete

Metalwork described as "holed for bolt(s)" shall be deemed to exclude the bolts unless otherwise described

Carried to Collection

R

Section: 3
Bill No. 5
CARPORTS, CANOPIES, ETC.
BTKM QUANTITY SURVEYORS

Descriptions of L-shaped and U-shaped anchor bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete

Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete

Metalwork described as "holed for bolt(s) shall be deemed to exclude the bolts unless otherwise described

STEEL, ERECTED AND FIXED IN POSITION COMPLETE:

THE FOLLOWING IN COLUMN AND BEAM STRUCTURE CARPORTS, CANOPY'S, ETC.

Welded columns in single lengths with flat section base, top, bearer and connection plates bolted to steel, brickwork and/or concrete:

28	100 x 100 x 4mm Hollow section column 3000mm high	m	90
29	Ditto, but 3300mm high	m	86
30	160 x 80 x 3mm Rectangular beams	t	2.33

STEEL COLUMNS AND BEAMS

Welded columns in single lengths with flat section base, top, bearer and connection plates bolted to concrete columns

31	254 x 146mm x 31kg/m H-section columns	t	0.26
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STEEL TRUSSES AND BEAMS

Welded beams in single lengths with flat section bearer and connection plates bolted to steel trusses

32	IPE 160 I-section in trusses	t	0.14
33	IPE 200 I-section in trusses	t	0.40

Carried to Collection

Section: 3
Bill No. 5
CARPORTS, CANOPIES, ETC.
BTKM QUANTITY SURVEYORS

R

PURLINS, GIRTHS, BRACING, ETC:

Purlins and girths welded to steel:

34	150 x 75 x 20 x 2,5mm Purlins	t	5.11
35	35 x 35 x 3mm Thick Angle edge trim	m	221
36	Cross bracing consisting of 50 x 50 x 3mm angle iron holed and bolted at ends and fixed to trusses.	m	462
37	50 x 50 x 4mm Angle section knee bracing	m	46
38	4mm Thick flat section closure plates	No	52
39	50 x 50 x 5mm Thick Angle section 75mm long welded to back of purlins	No	170
40	60 x 60 x 6mm Thick Angle section, ditto.	No	24

STEEL TRUSSES, ETC

Welded roof trusses of angle section rails, struts, braces, cleats, etc and flat section bearer, gusset and connection plates bolted to steel

41	300 x 300 x 6mm Baseplate with and including 4 holes	No	60
42	280 x 390 x 10mm Base plate four holed for bolts and welded on	No	6
43	15mm Thick non-shrink grout under baseplates, chamfered off at edges	m2	8

Sundries

Bolts, etc:

44	M12 x 100mm Chemical anchor bolts	No	240
45	M16 Grade 8.8 anchor bolts with a minimum anchor length of 300mm	No	24

METAL ROOF COVERINGS, ETC
(MEASURED NET)

Carried to Collection

R

Section: 3
Bill No. 5
CARPORTS, CANOPIES, ETC.
BTKM QUANTITY SURVEYORS

(HAYLETT FORMULA WORK GROUP NO. 124)

SUPPLEMENTARY PREAMBLES:

0.53mm Concealed fix "Kliptite 700mm" or other similar approved profiled roof sheeting with transverse stiffener ribs roll-formed in continuous lengths from certified zinkalume AZ150 coated steel G55 0,53mm (heavy industrial) in mill finish and fixed to steel purlins using K700 clips and class 3 fasteners, maximum internal span of 2000mm, all in accordance with the manufacturers specifications.

CERTIFICATE FOR GALVANISED ROOF COVERING:

The contractor is to submit a certificate signed by the merchant, stating that the galvanised roof covering supplied, complies with the required thickness specified

PROFILED METAL SHEETING AND ACCESSORIES:

Approved interlocking Z275 spelter galvanised troughed sheet steel with "Chestnut Brown Chromadek" finish on one side in single lengths fixed to steel purlins or rails and galvanised sheet steel accessories with chromadek finish on one side:

46	On portal frames and purlins in carports, canopy and guardhouse, etc.	m2	630
47	Ridgecapping, 450mm girth	m	39
48	Ditto, to canopy roof	m	10

(HAYLETT FORMULA WORK GROUP NO. 134)

PAINTWORK, ETC

(HAYLETT FORMULA WORK GROUP NO. 152)

PAINTWORK ETC TO NEW WORK:

Carried to Collection

Section: 3
Bill No. 5
CARPORTS, CANOPIES, ETC.
BTKM QUANTITY SURVEYORS

R

ON NEW METAL

Spot priming defects in pre-primed surfaces with "Dulux vinyl wash" metal primer and applying one undercoat and two coats approved alkyd eggshell enamel paint on steel, on

49	On general surfaces of carport frames, rafters, purlins, etc.	m2	656
50	Ditto on base plates, etc.	m2	12
51	On general surfaces not exceeding 300mm wide.	m	594

Carried to Collection

R

Section: 3
Bill No. 5
CARPORTS, CANOPIES, ETC.
BTKM QUANTITY SURVEYORS

Section: 3

Bill No. 5

CARPORTS, CANOPIES, ETC.

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

147

148

149

150

151

152

153

154

Carried Forward to Summary of Section No: 3

R

Section: 3

Bill No. 5

CARPORTS, CANOPIES, ETC.

BTKM QUANTITY SURVEYORS

BILL NO. 6

PUMP HOUSE, ETC.

PREAMBLES

For Preambles refer to "Specification of Materials and Methods to be used PW 371"

NOTE : All excavations are measured as being in "earth" and/or filling compacted to 98% modified AASHTO density

THE FOLLOWING IN PUMPHOUSE, ETC.

EARTHWORKS

EXCAVATIONS ETC:

EXCAVATIONS IN EARTH, EXISTING GRAVEL FILLING UNDER SOLID FLOORS, ETC., BELOW THE NATURAL OR REDUCED LEVELS AS DESCRIBED:

(HAYLETT FORMULA WORK GROUP NO. 104)

EXCAVATION, FILLING, ETC.

Excavation in earth not exceeding 2 m deep

1	Trenches, ground beams, etc. not exceeding 2m deep.	m3	14
2	Excavate in earth not exceeding 2m deep for storm water channels, aprons, etc.	m3	3
3	Compaction of ground surface under aprons, etc. including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compact to 93% modified AASHTO density	m2	8

Carried to Collection

Section: 3
Bill No. 6
PUMP HOUSE, ETC.

BTKM QUANTITY SURVEYORS

Extra over trench and hole excavations in earth for excavation in:

4	Soft rock	m3	1
5	Hard rock	m3	0.50

Extra over all excavations for carting away:

6	Surplus material from the excavations to a dumping site to be located by the contractor.	m3	17
---	--	----	----

Risk of collapse of excavations:

7	Sides of trenches and holes excavations from ground level to not exceeding 1,5m deep.	m2	28
---	---	----	----

Keeping excavations free of water:

8	Allow for keeping all excavations free from water and mud.	Item	
---	--	------	--

Compaction of surfaces:

9	Compaction of ground surface in trenches, etc. including scarifying for a depth of 150mm, breaking down over size material, adding suitable material where necessary and compact to 93% modified AASHTO density	m2	37
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G6 Earth filling supplied by the contractor compacted to 98% Mod AASHTO density

10	Under aprons, etc.	m3	25
11	150mm Imported G6 sub-base layer in trenches compacted to 93% modified AASHTO density	m3	2
12	Ditto under floors compacted in 150mm layers to a total thickness of 600mm	m3	6

SOIL POISONING:

Soil insecticide:

13	Chlordane or other approved termite poison under bases, floors, aprons, ramps, steps, pavings, etc including forming and poisoning shallow furrows against foundation walls etc, filling in furrows and ramming	m2	65
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Carried to Collection

R

Section: 3
Bill No. 6
PUMP HOUSE, ETC.
BTKM QUANTITY SURVEYORS

14 Tests to determine the degree of compaction, etc. of ground or filling

No

3

CONCRETE, FORMWORK AND REINFORCEMENT

SUPPLEMENTARY PREAMBLES:

Note:

The attention of tenderers is drawn to the fact that very stringent control measures will apply in respect of the quality of all concrete ingredients

Cost of tests:

The costs of making, storing and testing of concrete test cubes as required under clause 7 "Tests" of SABS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the representative/agent. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the representative/agent. (Test cubes are measured separately)

(HAYLETT FORMULA WORK GROUP NO. 104)

FORMWORK, ETC

(HAYLETT FORMULA WORK GROUP NO. 111)

NOTE:

Unless otherwise described, the full descriptions in the preceding Bills are to apply equally to the short descriptions used in this Bill

REINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES

Carried to Collection

R

Section: 3
Bill No. 6
PUMP HOUSE, ETC.
BTKM QUANTITY SURVEYORS

25 Mpa/19mm Reinforced concrete in:

15	Apron 1200mm wide x average 150mm thick (1:50 slope) with rounded salient edges and finished on exposed surfaces with 2:1 cement mortar, laid to falls in panels not exceeding 1,8m long with 12mm bitumen impregnated softboard movement joints with exposed edges, raked out for a depth of 10mm and filled with bituminous compound including all necessary excavations and formwork.	m	21
16	Extra over for sloping ramp	m2	2
17	Ground beams, etc.	m3	11
18	Surface beds cast in panels on waterproofing	m3	2

CONCRETE SUNDRIES

Finishing top surfaces of concrete smooth with a wood float

19	Striking off concrete - non-slip finish	m2	37
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TEST BLOCKS:

20	Making and testing 150 x 150 x 150mm concrete strength test cube	No	3
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ROUGH FORMWORK (DEGREE OF ACCURACY II)

Extra over rough formwork to sides for smooth formwork

21	Foundation beams	m2	18
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Boxing in rough formwork to form

22	110 x 170mm Chamfer along top edge	m	16
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MOVEMENT JOINTS ETC

Expansion joints with 15mm Durachord backing chord between vertical concrete and brick surfaces

23	10mm Jointex in expansion joint	m	7
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Carried to Collection

Section: 3
Bill No. 6
PUMP HOUSE, ETC.

BTKM QUANTITY SURVEYORS

R

Carried to Collection

Section: 3
Bill No. 6
PUMP HOUSE, ETC.
BTKM QUANTITY SURVEYORS

(HAYLETT FORMULA WORK GROUP NO. 116)

Brickwork of NFX bricks (14 MPa nominal compressive strength) in class II mortar:

33	Half brick walls in lining to top and sides of concrete beam	m2	9
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FACE BRICKWORK:

EXTERNAL FACE BRICKWORK:

75mm FBX face bricks pointed with recessed horizontal and vertical joints, part in larger panels between adjacent different types of face brickwork

34	Extra over brickwork for face brickwork in stretcher bond	m2	9
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SUPERSTRUCTURE:

MASONRY, ETC.

Brickwork of NFX bricks (14 MPa nominal compressive strength) in class I mortar:

35	One brick walls in superstructure	m2	33
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36	Ditto, in gables	m2	4
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37	Half brick wall in beamfilling	m2	3
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38	Face brick-on-edge flat lintel course in cement mortar 220mm wide on soffit and pointing on 110mm wide projecting soffit and one side	m	1
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39	Cut face brick-on-edge external window sill, 180mm wide, set sloping and slightly projecting in cement mortar and pointed on top, front edge and projecting soffit including all necessary fair raking cutting to facings under and fair and fitted ends	m	1
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BRICK REINFORCEMENT

40	Brick reinforcement 150mm wide built into brick walls with sufficient laps at end joints, angles and intersections (measured net)	m	127
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Carried to Collection

Section: 3
Bill No. 6
PUMP HOUSE, ETC.

BTKM QUANTITY SURVEYORS

R

TEMPORARY TURNING PIECES, ETC

41	To flat brick lintels not exceeding 300mm wide	m	10
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Pre-stressed fabricated lintels

42	100 x 70mm Lintels n.e. 3000mm long. (In no. 6)	m	10
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ROOF SUNDRIES

(HAYLETT FORMULA WORK GROUP NO. 126)

43	38 x 1,6mm Galvanised hoop iron roof tie with one end built six courses deep into top of brickwork and other end wrapped around and nailed to trusses	No	8
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FASCIAS AND BARGEBOARDS

Tempered fibre cement

44	15 x 225mm Fascia or barge board countersunk screwed to support and roof timbers (elsewhere) with one brass screw at maximum 750mm centres and jointed with and including standard aluminium halfround cover strips at all joints	m	18
----	---	---	----

CEILINGS

(HAYLETT FORMULA WORK GROUP NO. 129)

SUSPENDED CEILINGS

New suspended ceiling consisting of galvanized steel members with aluminium facings - T38 Exposed Grid system with T38 (3600) main tees at 600mm centres, T38 (1200) at 1200mm centres SM 25 recessed wall angles and flush plaster trim sections for bulkheads, all with Vivid White finish and suspended with 2.5mm diameter galvanised wires not exceeding 1m, fixed to branderling or riveted to underside of concrete slabs with steel pop rivets. All strictly in accordance with manufacturer's specifications with 1200 x 600 x 12.5mm thick Vinyl covered Gypsum board lay-in tiles, white fissured finish

45	Vinyl clad fibre cement ceiling.	m2	14
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Carried to Collection

R

Section: 3
Bill No. 6
PUMP HOUSE, ETC.

BTKM QUANTITY SURVEYORS

CORNICES, ETC.

46	Pre-painted aluminium shadowline cornice	m	14
----	--	---	----

PLASTERING

(HAYLETT FORMULA WORK GROUP NO. 142)

SCREEDS

Screeds on concrete

GRANOLITHIC

Untinted granolithic on concrete, wood floated to a true, even true slip resistant wood floated finish, to the Architect's approval

47	30mm Thick on floors and landings	m2	14
----	-----------------------------------	----	----

INTERNAL PLASTER

Two coats cement plaster on brickwork

48	On walls	m2	33
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49	On narrow widths	m2	33
----	------------------	----	----

Carried to Collection

Section: 3
Bill No. 6
PUMP HOUSE, ETC.
BTKM QUANTITY SURVEYORS

R

Section: 3

Bill No. 6

PUMP HOUSE, ETC.

COLLECTION

Total Brought Forward from Page No

**Page
No**

Amount

156

157

158

159

160

161

162

163

Carried Forward to Summary of Section No: 3

R

Section: 3

Bill No. 6

PUMP HOUSE, ETC.

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<u>SECTION 3</u>			
<u>BILL NO. 7</u>			
<u>POOL FENCING, ETC.</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
<u>SUPPLEMENTARY PREAMBLES</u>			
NOTE : Flat wrap razor security wire to comply with CKS 592 specification. Flat wrap wire and clips to be Aluzink coated			
NOTE : All excavations are measured as being in "earth" and/or filling compacted to 98% modified AASHTO density -----			
<u>SWIMMING POOL FENCING, ETC.</u>			
<u>EARTHWORKS</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 104)</u>			
<u>EXCAVATIONS</u>			
<u>Excavate in earth not exceeding 2m deep below natural, elevated or reduced ground level for</u>			
1	Bases, etc. m3	2	
<u>CART AWAY, ETC.</u>			
2	Extra over all excavations for carting away surplus material from excavations and/or stockpile on site to a dumping site to be located by the Contractor m3	1	
Carried to Collection			R
Section: 3			
Bill No. 7			
POOL FENCING, ETC.			
BTKM QUANTITY SURVEYORS			

FILLING

- | | | | |
|---|---|----|-----|
| 3 | Backfilling from the excavations to column bases and holes compacted to 90% modified AASHTO density | m3 | 0.4 |
|---|---|----|-----|

CONCRETE

(HAYLETT FORMULA WORK GROUP NO. 110)

- | | | | |
|---|---|----|---|
| 4 | 15MPa/38mm mass concrete in bases, size 350 x 350 x 450mm with chamfered top surface projecting 50mm above surrounding ground level including any necessary formwork, etc | m3 | 1 |
|---|---|----|---|

METALWORK

(HAYLETT FORMULA WORK GROUP NO. 136)

Security fencing including site clearance and preparation of ground

- | | | | |
|---|---|---|----|
| 5 | Swimming pool fencing 1,0m high above ground level, formed of 50 x 20 x 2,5mm thick top and bottom rails, each 1500mm long between uprights, welded to 50 x 50mm x 2,5mm uprights 1350mm high extreme and cast 250mm deep in concrete base (elsewhere measured), the frame filled in with 8mm square solid bars at 100mm centres . (Posts = 33, Bars = 448) | m | 50 |
|---|---|---|----|

The following in mild steel gates

- | | | | |
|---|--|----|---|
| 6 | Single pedestrian gate size 0,90 x 0,90m ditto with and including one pair of 100mm bullet hinges, self-closing spring and self-closing mechanism. (Vertical bars = 7) | No | 1 |
|---|--|----|---|

PAINTING

(HAYLETT FORMULA WORK GROUP NO. 152)

Prepare and apply one coat red oxide primer, one universal undercoat an two coats high gloss enamel paint

- | | | | |
|---|--|----|-----|
| 7 | On general surfaces of steelwork (Both sides measured) | m2 | 102 |
| 8 | On steel fencing. (Both sides measured) | m2 | 102 |

Carried to Collection

R

Section: 3
Bill No. 7
POOL FENCING, ETC.
BTKM QUANTITY SURVEYORS

Section: 3
Bill No. 7
POOL FENCING, ETC.
COLLECTION

Total Brought Forward from Page No

Page No	Amount
165	
166	

Carried Forward to Summary of Section No: 3

Section: 3
Bill No. 7
POOL FENCING, ETC.
BTKM QUANTITY SURVEYORS

R

Item No	Quantity	Rate	Amount
<u>SECTION 3</u>			
<u>BILL NO. 8</u>			
<u>BUILDER'S WORK IN CONNECTION WITH SPECIAL SERVICES</u>			
<u>PREAMBLES</u>			
For Preambles refer to "Specification of Materials and Methods to be used PW 371"			
NOTE : Unless otherwise stated herein all items in this bill shall be deemed to fall into Work Group No. 160 for Haylett Formula purposes			
<u>ELECTRICAL INSTALLATION</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 160)</u>			
1	50mm PVC sleeve pipe and excavations not exceeding 1m deep	m	50
2	75mm PVC sleeve pipe and excavations not exceeding 1m deep	m	33
3	110mm PVC sleeve pipe and excavations not exceeding 1m deep	m	30
4	160mm PVC sleeve pipe and excavations not exceeding 1m deep	m	24
5	50mm PVC sleeve pipe fixed to wall	m	40
6	110mm PVC sleeve pipe fixed to wall	m	18
7	Extra for 50mm bend	No	14
8	Extra for 75mm bend	No	3
9	Extra for 110mm bend	No	8
Carried to Collection			R
Section: 3			
Bill No. 8			
BUILDERSWORK IN CONNECTION WITH SPECIAL SER			
BTKM QUANTITY SURVEYORS			

10	Excavate in earth for and build manhole with one brick side on and including a 100mm thick 20MPa/19mm mass concrete base projecting 100mm under wall for face all round, including finishing in 3:1 cement plaster on inside, with 100mm thick 20MPa/19mm mass concrete slab over finished on all exposed surfaces in untinted granolithic with angles rounded with opening for and including 600 x 600mm cast iron double seal heavy duty manhole cover and frame with a mass of 75kg, laid in cement and sealed intallow; size internally 0,6 x 0,6 x 0,9m deep	No	1	
<u>TELEPHONE AND INTERCOM INSTALLATION</u>				
NOTE : All sleeve pipes and pipe conduits to be supplied with draw wires as necessary for fishing of cables and wiring -----				
11	32mm PVC sleeve pipe and excavations not exceeding 1m deep	m	250	
12	50mm PVC sleeve pipe and excavations not exceeding 1m deep	m	30	
13	32mm PVC sleeve pipe fixed to wall	m	55	
14	50mm PVC sleeve pipe fixed to wall	m	25	
15	Extra for 32mm bend	No	24	
16	Extra for 50mm bend	No	12	
17	Excavate in earth for and build manhole with one brick side on and including a 100mm thick 20MPa/19mm mass concrete base projecting 100mm under wall for face all round, including finishing in 3:1 cement plaster on inside, with 100mm thick 20MPa/19mm mass concrete slab over finished on all exposed surfaces in untinted granolithic with angles rounded with opening for and including 600 x 600mm cast iron double seal heavy duty manhole cover and frame with a mass of 75kg, laid in cement and sealed intallow; size internally 0,6 x 0,6 x 0,9m deep	No	1	
Carried to Collection				
Section: 3				
Bill No. 8				
BUILDERSWORK IN CONNECTION WITH SPECIAL SER				
BTM QUANTITY SURVEYORS				

Section: 3

Bill No. 8

BUILDERSWORK IN CONNECTION WITH SPECIAL SERVICES

COLLECTION

Total Brought Forward from Page No

Page
No

168

169

Amount

Carried Forward to Summary of Section No: 3

Section: 3

Bill No. 8

BUILDERSWORK IN CONNECTION WITH SPECIAL SER

BTKM QUANTITY SURVEYORS

R

SECTION SUMMARY - Section No 3: Site Works

Bill No		Page No	Amount
1	GENERAL SITE WORKS	123	
2	STORMWATER, SOIL DRAINAGE AND WATER SUPPLY	132	
3	PARKING AND PAVING	136	
4	WALKWAYS AND BOUNDARY WALLS, ETC.	146	
5	CARPORTS, CANOPIES, ETC.	155	
6	PUMP HOUSE, ETC.	164	
7	POOL FENCING, ETC.	167	
8	BUILDERSWORK IN CONNECTION WITH SPECIAL SERVICES	170	
Carried to Final Summary			R
Section: 3			
BTKM QUANTITY SURVEYORS			

SECTION NO 4:
ELECTRICAL INSTALLATION

Item No		Quantity	Rate	Amount
	<u>SECTION 4</u>			
	<u>BILL No. 1</u>			
	<u>SMALL POWER AND LIGHTING</u>			
	<u>(HAYLETT FORMULA WORK GROUP NO. 160)</u>			
	NOTICE TO TENDERERS:			
	1 The tenderer for the principal contract shall submit additional information regarding the installer of the Electrical Installation together with the returnable enclosed with this part of the tender enquiry documents.			
	2 The Contractor, on acceptance of his tender for the principal contract, shall submit within the period stated, the information indicated on the forms following immediately after the Summary of the bills of quantities for this installation.			
	3 The Conditions of Contract and the application of Contract Price Adjustment Provisions (if applicable) shall be as set out in Part A: Section1: Preliminaries.			
	4 The descriptions in these bills of quantities shall be read in conjunction with the specifications.			
	5 The unit rate for each item in these bills of quantities shall include for all materials, labour, profit, transport, etc., necessary for the execution and complete installation of the work in accordance with the description.			
	6 These bills of quantities shall not be used for ordering purposes. The Contractor shall check the lengths of cables on site as well as quantities of all other material before ordering any such material. Any allowance for off-cuts or waste shall be made in the unit rates.			
	7 The rate shall exclude Value Added Tax and the total carried over to the final summary in Part A.			
	8 All material covered by Specification shall, wherever possible, be of South African manufacture.			
	Carried to Collection		R	
	Section: 4			
	Bill No. 1			
	LOW VOLTAGE DISTRIBUTION			
	BTKM QUANTITY SURVEYORS			

STANDARD SPECIFICATIONS

The follow standard specifications shall be read in conjunction with the project specifications and bills of quantities:

Section A - Preambles to Standard Specifications (PW 354)

Section B - Installation Specifications (PW 354) Section C - Quality Specifications for Materials and Equipment of Electrical Work Installations (September 2005)

SUPPLEMENTARY PREAMBLES

Items, materials or methods

Items, materials or methods to be used specified by trade names or catalogue numbers are only an indication of the quality required. The use of trade names for items, materials or methods shall also mean - or other approved - on the condition that prior approval is obtained from the Architect / Engineer.

REMOVAL OF EXISTING INSTALLATION

Disconnect and take out and remove all distribution boards, complete with cabling to existing circuits, etc. as indicated by Engineer

			Item
1	All existing distribution boards and cabling		

MINIATURE SUBSTATION THLB 5 (Schedule No. 1)

2	Existing Miniature Sub-Station at Kitchen	No	1
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Section 1 with 30% spare space and Light Orange cover plate:

3	600 A Triple pole Main switch on load Isolator (Existing)	No	1
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4	450 A Triple pole circuit breaker - Circuit 1 - Generator 1	No	1
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Section 2 with 30% spare space and Light Orange cover plate:

5	<u>63 A Triple pole circuit breaker - Circuit 2 - DB-G 2 Normal Power</u>	No	1
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Carried to Collection

R

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

6	63 A Triple pole circuit breaker - Circuit 3 - DB-G 3_Normal_Power	No	1	
7	150 A Triple pole circuit breaker - Circuit 4 - DB K_Normal_Power	No	1	
<u>STANDBY GENERATOR 1 (Schedule No. 2)</u>				
8	Supply, install and commission one (1) off 300 kVA Standby Generator, as specified - See Generators Bill	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
9	450 A Triple pole Main switch on load isolator	No	1	
10	200 A Triple pole circuit breaker - Circuit 1 - DB-G-1(E) (Block H)	No	1	
11	150 A Triple pole circuit breaker - Circuit 2 - DB-G-2(E) (Block A - GF)	No	1	
12	125 A Triple pole circuit breaker - Circuit 3 - DB-G-3(E) (Block B - GF)	No	1	
13	150 A Triple pole circuit breaker - Circuit 4 - DB-K(E) (Block K - Kitchen)	No	1	
14	63 A Triple pole circuit breaker - Circuit 5 - DB-GH(E) (Block GH - Entrance to Site)	No	1	
15	63 A Triple pole circuit breaker - Circuit 6 - DB-PH(E) (Pump house at Water Tower)	No	1	
<u>DISTRIBUTION BOARD - DB-GH(E) (Entrance to Site Distribution Board) (Schedule No. 3)</u>				
16	Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivorine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Red cover plate:</u>				
17	63 Double pole Main switch on load isolator	No	1	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

18	10 A Single pole circuit breaker - Circuit 1 - Guard House Lights	No	1	
19	10 A Single pole circuit breaker - Circuit 2 - Car Canopy Lights	No	1	
20	10 A Single pole circuit breaker - Circuit 3 - External Lights	No	1	
21	30 mA, 63 A Double pole Earth Leakage Unit without overload protection	No	1	
22	10 A Single pole circuit breaker - Circuits 4 - Socket Outlets	No	1	
23	10 A Single pole circuit breaker - Circuit 5 - Dedicated Sockets	No	1	
24	10 A Single pole circuit breaker - Circuit 6 - Wall Heater	No	1	
<u>DISTRIBUTION BOARD - DB-PH(E) (Pump House Distribution Board) (Schedule No. 4)</u>				
25	Wall mounted self standing Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
26	63 A Triple pole Main switch on load isolator	No	1	
27	63 A Triple pole circuit breakers - Circuits 1 - 2 - Pumps	No	2	
28	63 A Single pole circuit breaker - Circuit 3 - Distribution Board DB-PA(E) (Parking Area)	No	1	
29	10 A Single pole circuit breaker - Circuit 4 - Lights	No	1	
30	10 A Single pole circuit breaker - Circuit 5 - External Lights	No	1	
31	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
32	10 A Single pole circuit breaker - Circuit 6 - Socket Outlets	No	1	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

DISTRIBUTION BOARD - DB-PA(E) (Parking Area Distribution Board) (Schedule No. 5)

33	Wall mounted self standing Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1
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Section 1 with 30% spare space and Signal Red cover plate:

34	63 A Double pole Main switch on load isolator	No	1
35	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1
36	20 A Single pole circuit breaker - Circuits 1 - 4 - Socket Outlets	No	4
37	10 A Single pole circuit breaker - Circuits 5 - 7 - Lights	No	3

DISTRIBUTION BOARD - DB-G-1(E) (Block H Distribution Board) (Schedule No. 6)

38	Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1
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Section 1 with 30% spare space and Red cover plate:

39	200 Triple pole Main switch on load isolator	No	1
40	20 A Single pole circuit breaker - Circuit 1 - 6 - Dedicated sockets	No	6
41	30 mA, 63 A Double pole earth leakage unit without overload protection	No	3
42	20 A Single pole circuit breaker - Circuits - 7 - 18 - Socket Outlets	No	12
43	63 A Triple pole circuit breakers - Circuit 19 - 20 - Mess Hall Air Conditioners	No	2

Carried to Collection

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

R

44	20 A Single pole circuit breaker - Circuit 21 - Swimming pool	No	1	
45	20 A Single pole circuit breaker - Circuit 22 - Telecom Operator Air Conditioner	No	1	
46	63 A Single pole circuit breaker - Circuit 23 - 24 - Board Room Air Conditioners	No	2	
47	20 A Single pole circuit breaker - Circuit 25 - 26 - Board Room Air Conditioners	No	2	
48	63 A Triple pole circuit breaker - Circuit 27 - 29 - Main Hall Air Conditioners	No	3	
49	20 A Triple pole circuit breaker - Circuit 30 - Main Hall Air Conditioner	No	1	
50	63 A Triple pole circuit breaker - Circuit 31 - 33 - Mess Hall Air Conditioners	No	3	
51	20 A Single pole circuit breaker - Circuit 34 - 35 - Mess Hall Air Conditioners	No	2	
52	30 A Single pole circuit breaker - Circuit 36 - Hydroboil	No	1	
53	20 A Single pole circuit breaker - Circuit 37 - Toaster	No	1	
54	40 A Double pole circuit breaker - Circuit 38 - 39 - Bains Marie	No	2	
55	10 A Single pole circuit breakers - Circuits 40 - 42 - Emergency lights	No	3	
56	10 A Single pole circuit breaker - Circuit 43 - External Lights Board Room	No	1	
57	10 A Single pole circuit breaker - Circuit 44 - External Lights Halls	No	1	
58	10 A Single pole circuit breaker - Circuits 45 - 53 - Lights	No	9	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

DISTRIBUTION BOARD - DB-G-2 (Block A-GF Distribution Board) (Schedule No. 7)

59	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>			
60	150 Triple pole Main switch on load isolator	No	1
61	80 A Triple pole circuit breaker - Circuit 1 - DB-G-2_1	No	1
62	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2
63	20 A Single pole circuit breakers - Circuit 2 - 9 - Socket outlets	No	8
64	20 A Triple pole circuit breakers - Circuit 10 - 11 - Heat Pumps	No	2
65	20 A Single pole circuit breaker - Circuit 12 - 17 - Hot Water Cylinders	No	6
66	10 A Single pole circuit breakers - Circuit 18 - 22 - Lights	No	5
67	5 A Single pole circuit breaker - Circuit 23 - 25 - Exhaust Fans	No	3
68	10 A Single pole circuit breakers - Circuit 26 - External Lights	No	1
69	10 A Single pole circuit breakers - Circuit 27 - 28 - Emergency Lights	No	2
70	10 A Single pole circuit breaker - Circuit 29 - 30 - Passage Lights	No	2
71	10 A Single pole circuit breaker - Circuit 31 - Toilet Lights	No	1
72	1 x 24 hr Electronic Timer - Circuit 32 - for Lighting Circuits below:	No	1
73	10 A Single pole circuit breaker - Circuit 33 - Store Room Lights	No	1

Carried to Collection

R

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

74	10 A Single pole circuit breaker - Circuit 34 - 36 - Lobby Lights	No	3	
75	10 A Single pole circuit breaker - Circuit 37 - Bathroom Lights	No	1	
76	10 A Single pole circuit breaker - Circuit 38 - Stair Lights	No	1	
77	10 A Single pole circuit breaker - Circuit 39 - 40 - Guest Toilet Lights	No	2	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
78	80 Triple pole Main switch on load isolator	No	1	
79	63 A Triple pole circuit breaker - Circuit 1 - DB-G-2-1 NORMAL POWER	No	1	
80	20 A Single pole circuit breakers - Circuits 2 - 9 - Heaters	No	8	
81	10 A Single pole circuit breaker - Circuit 10 - 14 - Shaving Plugs	No	5	
82	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
83	20 A Single pole circuit breaker - Circuit 15 - 21 - Under Counter Instant Water Heaters	No	7	
84	20 A Single pole circuit breaker - Circuit 22 - 23 - Hand Driers	No	2	
<u>DISTRIBUTION BOARD - DB-G-2 1 (Block A-FF Distribution Board) (Schedule No. 8)</u>				
85	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivorine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
86	100 Triple pole Main switch on load isolator	No	1	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

87	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
88	20 A Single pole circuit breaker - Circuits 1 - 8 - Socket Outlets	No	8	
89	10 A Single pole circuit breaker - Circuit 9 - 13 - Lights	No	5	
90	5 A Single pole circuit breaker - Circuit 14 - 16 - Extractor Fans	No	3	
91	10 A Single pole circuit breaker - Circuit 17 - 18 - Emergency lights	No	2	
92	10 A Single pole circuit breaker - Circuit 19 - TV Area Lights	No	1	
93	10 A Single pole circuit breaker - Circuit 20 - Toilet Lights	No	1	
94	1 x 24 hr Electronic Timer - Circuit 21 - for Lighting Circuits below:	No	1	
95	10 A Single pole circuit breaker - Circuit 22 - 23 - Passage Lights	No	2	
96	10 A Single pole circuit breaker - Circuit 24 - Bathroom Lights	No	1	
97	10 A Single pole circuit breaker - Circuit 25 - Store Room Lights	No	1	
98	10 A Single pole circuit breaker - Circuit 26 - Foyer Lights	No	1	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
99	63 Triple pole Main switch on load isolator	No	1	
100	20 A Single pole circuit breakers - Circuits 1 - 8 - Heaters	No	8	
101	10 A Single pole circuit breakers - Circuits 9 - 13 - Shaving plugs	No	5	
102	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
103	20 A Single pole circuit breaker - Circuit 14 - 20 - Under Counter Point of Use Electric Water Heaters	No	7	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

<u>DISTRIBUTION BOARD - DB-G-3 (Block B-GF Distribution Board) (Schedule No. 9)</u>				
104	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
105	160 Triple pole Main switch on load isolator	No	1	
106	100 A Triple pole circuit breaker - Circuit 1 - DB-G-3_1	No	1	
107	20 A Single pole circuit breakers - Circuits 2 - 5 - Dedicated Socket Outlets	No	4	
108	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
109	20 A Single pole circuit breakers - Circuits 6 - 13 - Socket Outlets	No	8	
110	10 A Single pole circuit breaker - Circuit 14 - Shaving Plugs	No	1	
111	20 A Single pole circuit breaker - Circuit 15 - 16 - Server Room Air Conditioners	No	2	
112	32 A Triple pole circuit breaker - Circuit 17 - Server Cabinet	No	1	
113	5 A Single pole circuit breaker - Circuit 18 - 21 - Extractor Fans	No	4	
114	10 A Single pole circuit breaker - Circuit 22 - 35 - Office Lights	No	14	
115	10 A Single pole circuit breakers - Circuits 36 - 37 - External Lights	No	2	
116	10 A Single pole circuit breakers - Circuits 38 - 39 - Emergency Lights	No	2	
117	10 A Single pole circuit breaker - Circuit 40 - Server Room Lights	No	1	
Carried to Collection				
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

118	10 A Single pole circuit breaker - Circuit 41 - 42 - Passage Lights	No	2	
119	10 A Single pole circuit breaker - Circuit 43 - Stair Lights	No	1	
120	10 A Single pole circuit breaker - Circuit 57 - 59 - Foyer Lights	No	3	
121	10 A Single pole circuit breaker - Circuit 64 - Swimming Pool Pump and Lights	No	1	
122	1 x 24 hr Electronic Timer - Circuit 21 - for Lighting Circuits below:	No	1	
123	10 A Single pole circuit breaker - Circuit 62 - 63 - Female & Male Toilets	No	2	
124	10 A Single pole circuit breaker - Circuit 41 - Printing Room Lights	No	1	
125	10 A Single pole circuit breaker - Circuit 60 - 61 - Guest Toilet Lights	No	2	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
126	80 A Triple pole Main switch on load isolator	No	1	
127	63 A Triple pole circuit breaker - Circuit 1 - DB G3_1_Normal_Power	No	1	
128	20 A Single pole circuit breakers - Circuits 2 - 9 - Heaters	No	8	
129	20 A Single pole circuit breaker - Circuit 10 - 15 - Hand Driers	No	6	
<u>DISTRIBUTION BOARD - DB-G-3 1 (Block B-FF Distribution Board) (Schedule No. 10)</u>				
130	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivorine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

Section 1 with 30% spare space and Signal Red cover plate:

131	100 A Triple pole Main switch on load isolator	No	1
132	20 A Single pole circuit breaker - Circuit 1 - 4 - Dedicated Socket Outlets	No	4
133	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2
134	20 A Single pole circuit breaker - Circuits 5 - 12 - Socket Outlets	No	8
135	10 A Single pole circuit breaker - Circuit 13 - Shaving Plugs	No	1
136	20 A Single pole circuit breaker - Circuit 14 - 15 - Server Room Air Conditioners	No	2
137	32 A Triple pole circuit breaker - Circuit 16 - Server Cabinet	No	1
138	5 A Single pole circuit breaker - Circuit 25 - 26 - Extractor Fans	No	2
139	10 A Single pole circuit breakers - Circuit 27 - 41 - Lights	No	15
140	10 A Single pole circuit breakers - Circuits 42 - 43 - Emergency lights	No	2
141	10 A Single pole circuit breaker - Circuit 44 - 45 - Passage Lights	No	2
142	10 A Single pole circuit breaker - Circuit 46 - Server Room Lights	No	1
143	10 A Single pole circuit breaker - Circuit 47 - Printing Room Lights	No	1
144	10 A Single pole circuit breaker - Circuit 48 - 49 - Female & Male Ablutions Lights	No	2

Section 2 with 30% spare space and Orange cover plate:

145	63 A Triple pole Main switch on load isolator	No	1
146	20 A Single pole circuit breaker - Circuit 1 - 8 - Heaters	No	8

Carried to Collection

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

R

147	20 A Single pole circuit breaker - Circuit 9 - 12 - Hand Driers	No	4
	<u>DISTRIBUTION BOARD - DB-K (Block K- Kitchen Distribution Board) (Schedule No. 11)</u>		
148	Wall mounted self standing Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivorine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1
	<u>Section 1 with 30% spare space and Signal Red cover plate:</u>		
149	150 A Triple pole Main switch on load isolator	No	1
150	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1
151	20 A Single pole circuit breakers - Circuits 1 - 6 - Socket outlets	No	6
152	10 A Single pole circuit breaker - Circuit 7 - 8 - Extraction Canopy Lights	No	2
153	63 A Triple pole circuit breaker - Circuit 9 - Island Extraction Canopy	No	1
154	63 A Triple pole circuit breaker - Circuit 10 - Wall Mounted Extraction Canopy	No	1
155	5 A Single pole circuit breaker - Circuit 11 - Bell	No	1
156	40 A Triple pole circuit breaker - Circuit 12 - Oil Jacketed Boiling Pot No 1	No	1
157	32 A Triple pole circuit breaker - Circuit 13 - Cold Room	No	1
158	20 A Single pole circuit breaker - Circuit 14 - Cold Room Blower Unit	No	1
159	63 A Triple pole circuit breaker - Circuit 15 - Freezer Room	No	1
160	20 A Single pole circuit breaker - Circuit 16 - Freezer Room Blower Unit	No	1

Carried to Collection

R

Section: 4
 Bill No. 1
 LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

161	63 A Triple pole circuit breaker - Circuit 17 - 80 l Tilting Pan No 1	No	1	
162	10 A Single pole circuit breakers Circuits 18 - 20 - Kitchen Lights	m	3	
<u>Section 2 with 30% spare space and Orange cover plate</u>				
163	150 A Triple pole Main switch on load isolator	No	1	
164	40 A Triple pole circuit breaker - Circuit 1 - Oil Jacketed Boiling Pan #2	No	1	
165	63 A Triple pole circuit breaker - Circuit 2 - 80 l Tilting Pan #2	No	1	
166	63 A Triple pole circuit breaker - Circuit 3 - 3 Plate Electric Stove	No	1	
167	63 A Triple pole circuit breaker - Circuit 4 - 10 Pan Convection Oven	No	1	
168	80 A Triple pole circuit breaker - Circuit 5 - Industrial Deep Fryer	No	1	
169	32 A Triple pole circuit breaker - Circuit 6 - Dish Washer	No	1	
170	10 A Triple pole circuit breaker- Circuit 7 - 30 l Food Mixer	No	1	
171	10 A Single pole circuit breaker - Circuit 8 - Meat Slicer	No	1	
172	10 A Triple pole circuit breaker - Circuit 9 - Meat Saw	No	1	
173	10 A Single pole circuit breaker - Circuit 10 - Vegetable Preparation Machine	No	1	
174	10 A Single pole circuit breaker - Circuit 11 - Potato Peeler	No	1	
175	10 A Single pole circuit breaker - Circuit 12 - Microwave Oven	No	1	
176	10 A Single pole circuit breaker - Circuit 13 - Bread Slicer	m	1	
177	32 A Single pole circuit breaker - Circuit 14 - 15 - Heat Pumps (HP1 & HP2)	No	2	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

178	30 A Single pole circuit breaker - Circuit 16 - 17 - Hot Water Cylinders (G1 & G2)	No	2	
179	10 A Single pole circuit breaker - Circuit 18 - 23 - Lighting Circuits	No	6	
180	10 A Single pole circuit breaker - Circuit 24 - Office Lights	No	1	
181	5 A Single pole circuit breaker - Circuit 25 - Office Extractor Fan	No	1	
182	10 A Single pole circuit breaker - Circuit 26 - K1-3 Storage Lights	No	1	
183	5 A Single pole circuit breaker - Circuit 27 - K1-3 Extractor Fan	No	1	
184	10 A Single pole circuit breaker - Circuit 28 - K1-4 Storage Lights	No	1	
185	5 A Single pole circuit breaker - Circuit 29 - K1-4 Storage Extractor Fan	No	1	
186	10 A Single pole circuit breaker - Circuit 30 - K1-6 Storage Lights	No	1	
187	5 A Single pole circuit breaker - Circuit 31 - K1-6 Storage Extractor Fan	No	1	
188	10 A Single pole circuit breaker - Circuit 32 - 33 - Ablutions Lights	No	2	
189	5 A Single pole circuit breaker - Circuit 34 - 35 - Extractor Fans (Ablutions)	No	2	
190	10 A Single pole circuit breaker - Circuit 36 - Emergency Lights	No	1	
191	10 A Single pole circuit breaker - Circuit 37 - External Lights	No	1	
192	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
193	20 A Single pole circuit breakers - Circuits 38 - 49 - Socket outlets	No	12	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

194	20 A Single pole circuit breakers - Circuits 50 - 51 - Office Air Conditioners	No	2		
	<u>MINIATURE SUBSTATION THLB 6 (Schedule No. 12)</u>				
195	Existing Miniature Sub-Station at Library	No	1		
	<u>Section 1 with 30% spare space and Light Orange cover plate:</u>				
196	600 A Triple pole Main switch on load Isolator (Existing)	No	1		
197	450 A Triple pole circuit breaker - Circuit 1 - Generator 2	No	1		
198	80 A Triple pole circuit breaker - Circuit 2 - DB-E NORMAL POWER (Block F-GF)	No	1		
199	80 A Triple pole circuit breaker - Circuit 3 - DB-H NORMAL POWER (Block D-GF)	No	1		
200	80 A Triple pole circuit breaker - Circuit 2 - DB-N NORMAL POWER (Block E-GF)	No	1		
201	80 A Triple pole circuit breaker - Circuit 3 - DB-W- NORMAL POWER (Block C-GF)	No	1		
	<u>STANDBY GENERATOR 2 (Schedule No. 13)</u>				
202	Supply, install and commission one (1) off 300 kVA Standby Generator, as specified - See Generators Bill	No	1		
	<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
203	450 A Triple pole Main switch on load isolator	No	1		
204	200 A Triple pole circuit breaker - Circuit 1 - DB-E(E) (Block F-GF)	No	1		
205	100 A Triple pole circuit breaker - Circuit 2 - DB-G(E) (Block G - Library)	No	1		
206	150 A Triple pole circuit breaker - Circuit 3 - DB-H(E) (Block D - GF)	No	1		
207	200 A Triple pole circuit breaker - Circuit 4 - DB-N(E) (Block E-GF)	No	1		
Carried to Collection					R
Section: 4					
Bill No. 1					
LOW VOLTAGE DISTRIBUTION					
BTKM QUANTITY SURVEYORS					

208	150 A Triple pole circuit breaker - Circuit 5 - DB-W(E) (Block C-GF)	No	1	
	<u>DISTRIBUTION BOARD - DB-G (Block G Distribution Board) (Schedule No. 14)</u>			
209	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivoryine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
	<u>Section 1 with 30% spare space and Signal Red cover plate:</u>			
210	100 Triple pole Main switch on load isolator	No	1	
211	100 A Triple pole circuit breaker - Circuit 1 - DB-GA	No	1	
212	20 A Single pole circuit breaker - Circuit 2 - 9 - Dedicated Socket Outlets	No	8	
	<u>DISTRIBUTION BOARD - DB-GA (Block G Distribution Board) (Schedule No. 15)</u>			
213	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivoryine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
	<u>Section 1 with 30% spare space and Signal Red cover plate:</u>			
214	100 Triple pole Main switch on load isolator	No	1	
215	30 mA, 63 A Double pole earth leakage unit without overload protection	No	3	
216	20 A Single pole circuit breaker - Circuit 1 - 12 - Socket Outlets	No	12	
217	30 A Triple pole circuit breaker - Circuit 13 - 15 - Air Conditioners (AC1, 2 &3)	No	3	
218	30 A Triple pole circuit breaker - Circuit 16 - Air Extractor Fan (AC6)	No	1	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

219	30 A Single pole circuit breaker - Circuit 17 - 18 - Air Conditioners (AC4 & 5)	No	2	
220	10 A Single pole circuit breaker - Circuit 19 - Emergency Lights	No	1	
221	10 A Single pole circuit breaker - Circuit 20 - External Lights	No	1	
222	1 x 24 hr Electronic Timer - Circuit 21 - for Lighting Circuits below:	No	1	
223	10 A Single pole circuit breaker - Circuit 25 - Passage Lights	No	1	
224	10 A Single pole circuit breaker - Circuit 26 - Office Lights	No	1	
225	10 A Single pole circuit breaker - Circuits 27 - 28 - Dimmer Lights	No	2	
226	10 A Single pole circuit breaker - Circuit 29 - 30 - Library Lights	No	2	
<u>DISTRIBUTION BOARD - DB-W (Block C-GF Distribution Board) (Schedule No. 16)</u>				
227	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
228	160 Triple pole Main switch on load isolator	No	1	
229	100 A Triple pole circuit breaker - Circuit 1 - DB-W-1	No	1	
230	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
231	20 A Single pole circuit breaker - Circuit 2 - 9 - Socket Outlets	No	8	
232	20 A Triple pole circuit breaker - Circuit 10 - 11 - Heat Pumps (HP1 & 2)	No	2	
233	30 A Single pole circuit breaker - Circuit 12 - Heat Pump HP3	No	1	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

234	20 A Single pole circuit breaker - Circuit 13 - 19 - Hot Water Cylinders	No	7	
235	10 A Single pole circuit breaker - Circuit 20 - 24 - Light Circuits	No	5	
236	5 A Single pole circuit breaker - Circuit 25 - 27 - Extractor Fans	No	3	
237	10 A Single pole circuit breaker - Circuit 28 - 29 - External Lights	No	2	
238	10 A Single pole circuit breaker - Circuit 30 - 31 - Emergency lights	No	2	
239	10 A Single pole circuit breaker - Circuit 32 - Stair Lights	No	1	
240	1 x 24 hr Electronic Timer - Circuit 33 - for Lighting Circuits below:	No	1	
241	10 A Single pole circuit breaker - Circuit 34 - Bathroom Lights	No	1	
242	10 A Single pole circuit breaker - Circuit 35 - Paraplegic Bathroom Lights	No	1	
243	10 A Single pole circuit breaker - Circuit 36 - Shower Room Lights	No	1	
244	10 A Single pole circuit breaker - Circuit 37 - 38 - Passage Lights	No	2	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
245	100 A Triple pole Main switch on load isolator	No	1	
246	80 A Triple pole circuit breaker - Circuit 1 - DB W_1_Normal_Power	No	1	
247	20 A Single pole circuit breaker - Circuit 2 - 9 - Heaters	No	8	
248	10 A Single pole circuit breaker - Circuit 10 - 14 - Shaving Plugs	No	5	
249	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

250	20 A Single pole circuit breaker - Circuit 15 - 21 - Under Counter Instant Water Heaters	No	7	
<u>DISTRIBUTION BOARD - DB-W-1 (Block C-FF Distribution Board) (Schedule No. 17)</u>				
251	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
252	100 Triple pole Main switch on load isolator	No	1	
253	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
254	20 A Single pole circuit breaker - Circuit 1 - 8 - Socket Outlets	No	8	
255	10 A Single pole circuit breaker - Circuit 9 - 12 - Shaving Plugs	No	4	
256	10 A Single pole circuit breaker - Circuit 13 - 17 - Lighting Circuits	No	5	
257	5 A Single pole circuit breaker - Circuit 18 - 19 - Extractor Fans	No	3	
258	10 A Single pole circuit breaker - Circuit 20 - 21 - Emergency Lights	No	2	
259	10 A Single pole circuit breaker - Circuit 22 - Foyer Lights	No	1	
260	1 x 24 hr Electronic Timer - Circuit 23 - for Lighting Circuits below:	No	1	
261	10 A Single pole circuit breaker - Circuit 24 - Bathroom Lights	No	2	
262	10 A Single pole circuit breaker - Circuit 25 - 26 - Store Room Lights	No	2	
263	10 A Single pole circuit breaker - Circuit 27 - Shower Room Lights	No	1	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

264	10 A Single pole circuit breaker - Circuit 28 - 29 - Passage Lights	No	2	
265	10 A Single pole circuit breaker - Circuit 30 - Laundry Lights	No	1	
266	20 A Single pole circuit breaker - Circuit 31 - 32 - Isolator 1 - 2	No	2	
267	20 A Triple pole circuit breaker - Circuit 33 - 34 - Isolator 3 - 4	No	2	
268	20 A Double pole circuit breaker - Circuit 35 - Isolator 5	No	1	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
269	100 A Triple pole Main switch on load isolator	No	1	
270	20 A Single pole circuit breaker - Circuit 1 - 8 - Heaters	No	8	
271	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
272	20 A Single pole circuit breaker - Circuit 9 - 15 - Under Counter Instant Water Heaters	No	7	
273	10 A Single pole circuit breaker - Circuit 16 - 20 - Shaving Plugs	No	5	
<u>DISTRIBUTION BOARD - DB-H (Block D-GF Distribution Board) (Schedule No. 18)</u>				
274	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivorine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
275	160 Triple pole Main switch on load isolator	No	1	
276	80 A Triple pole circuit breaker - Circuit 1 - DB-H-1	No	1	
277	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

278	20 A Single pole circuit breaker - Circuit 2 - 9 - Socket Outlets	No	8	
279	10 A Single pole circuit breaker - Circuit 10 - 17 - Shaving Plugs	No	8	
280	63 A Triple pole circuit breaker - Circuit 18 - 19 - Heat Pumps	No	2	
281	20 A Single pole circuit breaker - Circuit 20 - 25 - Hot Water Cylinders	No	6	
282	10 A Single pole circuit breaker - Circuit 26 - 30 - Lights	No	5	
283	5 A Single pole circuit breaker - Circuit 31 - 33 - Extractor Fans	No	3	
284	10 A Single pole circuit breaker - Circuit 34 - 35 - External Lights	No	2	
285	10 A Single pole circuit breaker - Circuit 36 - 37 - Emergency Lights	No	2	
286	10 A Single pole circuit breaker - Circuit 38 - 39 - Passage Lights	No	2	
287	1 x 24 hr Electronic Timer - Circuit 40 - for Lighting Circuits below:	No	1	
288	10 A Single pole circuit breaker - Circuit 41 - Bathroom Lights	No	1	
289	10 A Single pole circuit breaker - Circuit 42 - Store Room Lights	No	1	
290	10 A Single pole circuit breaker - Circuit 43 - Shower Room Lights	No	1	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
291	100 A Triple pole Main switch on load isolator	No	1	
292	80 A Triple pole circuit breaker - Circuit 1 - DB H_1_Normal_Power	No	1	
293	20 A Single pole circuit breaker - Circuit 2 - 9 - Heaters	No	8	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

294	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
295	20 A Single pole circuit breaker - Circuit 10 - 16 - Under Counter Instant Water Heaters	No	7	
<u>DISTRIBUTION BOARD - DB-H-1 (Block D-FF Distribution Board) (Schedule No. 19)</u>				
296	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivoryine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
297	100 A Triple pole Main switch on load isolator	No	1	
298	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
299	20 A Single pole circuit breakers - Circuits 1 - 8 - Socket outlets	No	8	
300	10 A Single pole circuit breaker - Circuit 9 - 16 - Shaving Plugs	No	8	
301	5 A Single pole circuit breaker - Circuit 17 - 19 - Extractor Fans	No	3	
302	10 A Single pole circuit breaker - Circuit 20 - 21 - Emergency Lights	No	2	
303	10 A Single pole circuit breaker - Circuit 22 - 26 - Lights	No	5	
304	10 A Single pole circuit breaker - Circuit 27 - Stair Lights	No	1	
305	1 x 24 hr Electronic Timer - Circuit 28 - for Lighting Circuits below:	No	1	
306	10 A Single pole circuit breaker - Circuit 29 - Bathroom Lights	No	1	
307	10 A Single pole circuit breaker - Circuit 30 - Store Room Lights	No	1	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

308	10 A Single pole circuit breaker - Circuit 31 - Shower Room Lights	No	1
309	10 A Single pole circuit breaker - Circuit 32 - 33 - Passage Lights	No	2
<u>Section 2 with 30% spare space and Orange cover plate:</u>			
310	80 A Triple pole Main switch on load isolator	No	1
311	20 A Single pole circuit breaker - Circuit 1 - 8 - Heaters	No	8
312	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1
313	20 A Single pole circuit breaker - Circuit 9 - 15 - Under Counter Instant Water Heaters	No	7
<u>DISTRIBUTION BOARD - DB-N (Block E-GF Distribution Board) (Schedule No. 20)</u>			
314	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivory main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>			
315	200 Triple pole Main switch on load isolator	No	1
316	100 A Triple pole circuit breaker - Circuit 1 - DB-N-1	No	1
317	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2
318	20 A Single pole circuit breaker - Circuit 2 - 9 - Socket Outlets	No	8
319	10 A Single pole circuit breaker - Circuit 10 - 13 - Shaving Plugs	No	4
320	63 A Triple pole circuit breaker - Circuit 14 - 15 - Heat pumps	No	2
321	20 A Single pole circuit breaker - Circuit 16 - 21 - Hot Water Cylinders	No	6

Carried to Collection

R

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

338	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
339	20 A Single pole circuit breaker - Circuit 10 - 16 - Under Counter Instant Water Heaters	No	7	
<u>DISTRIBUTION BOARD - DB-N-1 (Block E-FF Distribution Board) (Schedule No. 21)</u>				
340	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivoryine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
341	100 Triple pole Main switch on load isolator	No	1	
342	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
343	20 A Single pole circuit breaker - Circuit 1 - 8 - Socket Outlets	No	8	
344	10 A Single pole circuit breaker - Circuit 9 - 16 - Shaving Plugs	No	8	
345	10 A Single pole circuit breaker - Circuit 17 - 21 - Light Circuits	No	5	
346	5 A Single pole circuit breaker - Circuit 22 - 24 - Extractor Fans	No	3	
347	10 A Single pole circuit breaker - Circuit 25 - 26 - Emergency Lights	No	2	
348	10 A Single pole circuit breaker - Circuit 27 - 28 - Passage Lights	No	2	
349	10 A Single pole circuit breaker - Circuit 29 - Lobby Lights	No	1	
350	1 x 24 hr Electronic Timer - Circuit 30 - for Lighting Circuits below:	No	1	
351	10 A Single pole circuit breaker - Circuit 31 - Bathroom Lights	No	1	
Carried to Collection				R
Section: 4				
Bill No. 1				
LOW VOLTAGE DISTRIBUTION				
BTKM QUANTITY SURVEYORS				

352	10 A Single pole circuit breaker - Circuit 30 - Store Room Lights	No	1	
353	10 A Single pole circuit breaker - Circuit 31 - Shower Room Lights	No	1	
354	1 x 24 hr Electronic Timer - Circuit 32 - for Lighting Circuits below:	No	1	
355	10 A Single pole circuit breaker - Circuit 33 - Bar Area Lights	No	1	
356	10 A Single pole circuit breaker - Circuit 34 - Darts Room Lights	No	1	
357	20 A Single pole circuit breaker - Circuit 35 - 40 - Isolators 1 - 6 (IS1 - 6) (Equipment)	No	6	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
358	80 A Triple pole Main switch on load isolator	No	1	
359	20 A Single pole circuit breaker - Circuit 1 - 8 - Heaters	No	8	
360	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1	
361	20 A Single pole circuit breaker - Circuit 9 - 15 - Under Counter Instant Water Heaters	No	7	
<u>DISTRIBUTION BOARD - DB-E (Block F-GF Distribution Board) (Schedule No. 22)</u>				
362	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivorine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1	
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>				
363	200 Triple pole Main switch on load isolator	No	1	
364	80 A Triple pole circuit breaker - Circuit 1 - DB-E_1	No	1	
365	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

366	20 A Single pole circuit breaker - Circuit 2 - 9 - Socket Outlets	No	8	
367	10 A Single pole circuit breaker - Circuit 10 - 17 - Shaving Plugs	No	8	
368	60 A Triple pole circuit breaker - Circuit 18 - 19 - Heat pumps	No	2	
369	20 A Single pole circuit breaker - Circuit 20 - 25 - Hot Water Cylinders	No	6	
370	10 A Single pole circuit breaker - Circuit 26 - 30 - Lighting Circuits	No	5	
371	5 A Single pole circuit breaker - Circuit 31 - 33 - Extractor Fans	No	3	
372	10 A Single pole circuit breaker - Circuit 34 - 35 - External lights	No	1	
373	10 A Single pole circuit breakers - Circuits 36 - 37 - Emergency lights	No	2	
374	10 A Single pole circuit breaker - Circuit 38 - Stair Lights	No	1	
375	10 A Single pole circuit breaker - Circuit 39 - 40 - Passage Lights	No	2	
376	1 x 24 hr Electronic Timer - Circuit 41 - for Lighting Circuits below:	No	1	
377	10 A Single pole circuit breaker - Circuit 42 - Bathroom Lights	No	1	
378	10 A Single pole circuit breaker - Circuit 43 - Store Room Lights	No	1	
379	10 A Single pole circuit breaker - Circuit 44 - Shower Room Lights	No	1	
<u>Section 2 with 30% spare space and Orange cover plate:</u>				
380	100 Triple pole Main switch on load isolator	No	1	
381	80 A Triple pole circuit breaker - Circuit 1 - DB-E-1_Normal Power	No	1	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

382	20 A Single pole circuit breakers - Circuits 2 - 9 - Heaters	No	8
383	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1
384	20 A Single pole circuit breaker - Circuit 10 - 16 - Under Counter Instant Water Heaters	No	7
<u>DISTRIBUTION BOARD - DB-E-1 (Block F-FF Distribution Board) (Schedule No. 23)</u>			
385	Semi-Recessed mounted Distribution Board complete with doors, frames, sub frames, busbars, earth bar, one engraved ivorine main label and one typed legend card with 6 kA fault level rating and space to accommodate the switch gear as specified with additional 30% spare space	No	1
<u>Section 1 with 30% spare space and Signal Red cover plate:</u>			
386	100 Triple pole Main switch on load isolator	No	1
387	30 mA, 63 A Double pole earth leakage unit without overload protection	No	2
388	20 A Single pole circuit breaker - Circuit 1 - 8 - Socket Outlets	No	8
389	10 A Single pole circuit breakers - Circuits 9 - 16 - Shaving plugs	No	8
390	10 A Single pole circuit breaker - Circuit 17 - 21 - Lighting Circuits	No	5
391	5 A Single pole circuit breaker - Circuit 22 - 24 - Extractor Fans	No	3
392	10 A Single pole circuit breaker - Circuit 25 - 26 - Emergency lights	No	2
393	10 A Single pole circuit breaker - Circuit 27 - Stair Lights	No	1
394	10 A Single pole circuit breaker - Circuit 28 - 29 - Passage Lights	No	2
395	1 x 24 hr Electronic Timer - Circuit 30 - for Lighting Circuits below:	No	1

Carried to Collection

R

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

396	10 A Single pole circuit breaker - Circuit 31 - Store Room Lights	No	1
397	10 A Single pole circuit breaker - Circuit 32 - Bathroom Lights	No	1
398	10 A Single pole circuit breaker - Circuit 33 - Shower Room Lights	No	1
<u>Section 2 with 30% spare space and Orange cover plate:</u>			
399	100 A Triple pole Main switch on load isolator	No	1
400	20 A Single pole circuit breaker - Circuit 1 - 8 - Heaters	No	8
401	30 mA, 63 A Double pole earth leakage unit without overload protection	No	1
402	20 A Single pole circuit breaker - Circuit 9 - 15 - Under Counter Instant Water Heaters	No	7
<u>CABLES</u>			
<u>600/1 000V PVC/SWA/PVC copper cables in trenches, sleeves, on cable rack and/or fixed to walls as indicated on the drawings</u>			
403	4 mm ² x 3-core	m	1,105
404	10 mm ² x 4-core	m	65
405	16 mm ² x 1-core	m	60
406	16 mm ² x 3-core	m	135
407	16 mm ² x 4-core	m	105
408	25 mm ² x 1-core	m	660
409	25 mm ² x 4-core	m	175
410	35 mm ² x 1-core	m	90
411	35 mm ² x 4-core	m	335
412	50 mm ² x 4-core	m	65

Carried to Collection

R

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

413	70 mm ² x 4-core	m	150
414	95 mm ² x 4-core	m	420
415	120 mm ² x 4-core	m	85
416	150 mm ² x 1-core	m	160
417	150 mm ² x 4-core	m	155
418	185 mm ² x 1-core	m	80
419	240 mm ² x 1-core	m	120

CABLE TERMINATIONS

**Termination of 600/1 000V PVC/SWA and
PVC/SWA/ECC copper cables including lugs and
connections**

Note: The prices must include for cable gland and marking of
the cable.

420	4 mm ² x 3-core	No	58
421	10 mm ² x 4-core	No	14
422	16 mm ² x 1-core	No	8
423	16 mm ² x 3-core	No	4
424	16 mm ² x 4-core	No	4
425	25 mm ² x 1-core	No	128
426	25 mm ² x 4-core	No	6
427	35 mm ² x 1-core	No	24
428	35 mm ² x 4-core	No	10
429	50 mm ² x 4-core	No	4
430	70 mm ² x 4-core	No	8
431	95 mm ² x 4-core	No	12

Carried to Collection

R

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

432	120 mm ² x 4-core	No	2
433	150 mm ² x 1-core	No	16
434	150 mm ² x 4-core	No	4
435	185 mm ² x 1-core	No	8
436	240 mm ² x 1-core	No	16

EARTH WIRES

Standard copper earth conductor in trenches, sleeves, on cable rack and/or fixed to walls as indicated on the drawings, and bonded to cables with plastic strapping at 2 m intervals

437	2,5 mm ²	m	1,105
438	4 mm ²	m	65
439	10 mm ²	m	225
440	16 mm ²	m	515
441	25 mm ²	m	345
442	35 mm ²	m	65
443	50 mm ²	m	150
444	70 mm ²	m	505

CABLE TERMINATIONS

Termination of standard copper earth wires including lugs and connections

445	2,5 mm ²	No	58
446	6 mm ²	No	2
447	10 mm ²	No	6
448	16 mm ²	No	28
449	25 mm ²	No	12

Carried to Collection

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

R

450	35 mm²	No	2	
451	50 mm²	No	4	
452	70 mm²	No	24	
<u>AREA LIGHTING</u>				
<u>Area Lighting Fittings</u>				
453	Type A: Area floodlighting luminaire to be installed on a 6,9 m high, 6,0 m mounting height GRP pole: including a 75 W (128 LED's) lamp SUPPLY	No	18	
454	Type A: Area floodlighting luminaire to be installed on a 6,9 m high, 6,0 m mounting height GRP pole: including a 75 W (128 LED's) lamp INSTALL	No	18	
455	Type A2: Double (2 off) area floodlighting luminaires to be installed on a 6,9 m high, 6,0 m mounting height GRP pole: including a 75 W (128 LED's) lamp per luminaire SUPPLY	No	2	
456	Type A2: Double (2 off) area floodlighting luminaires to be installed on a 6,9 m high, 6,0 m mounting height GRP pole: including a 75 W (128 LED's) lamp per luminaire INSTALL	No	2	
457	Type B: Decorative post top luminaire, complete with 1 x 16 LED, 37 W CFL lamp, mounted on a 4,6 m GRP pole with a 4,0 m mounting height SUPPLY	No	8	
458	Type B: Decorative post top luminaire, complete with 1 x 16 LED, 37 W CFL lamp, mounted on a 4,6 m GRP pole with a 4,0 m mounting height INSTALL	No	8	
<u>CABLE TRAYS</u>				
<u>Galvanised medium duty cable tray between distribution panels and distribution boards, including short lengths and all fixing requirements</u>				
459	100 mm Wide cable trays	m	200	
Carried to Collection				R
Section: 4 Bill No. 1 LOW VOLTAGE DISTRIBUTION BTKM QUANTITY SURVEYORS				

460	150 mm Wide cable trays	m	56
<u>SLEEVES</u>			
<u>Unplasticised polyvinyl chloride (UPVC) sleeve piping including short lengths and jointing, laid in trench (trench and backfilling measured elsewhere)</u>			
461	50 mm Diameter pipe	m	66
462	100 mm Diameter pipe	m	45
<u>Extra on UPVC piping for:</u>			
463	50 mm Diameter long radius bend	No	8
464	100 mm Diameter long radius bend	No	10
<u>EXCAVATIONS, ETC.</u>			
<u>Excavate in earth and set excavated material aside for re-use as filling for:</u>			
465	Cable or sleeve trenches not exceeding 1m deep	m3	260
466	Extra over excavations in 'earth' for cable or sleeve trenches in 'soft rock'	m3	10
467	Extra over excavations in 'earth' for cable or sleeve trenches in 'rock'	m3	15
468	Selected and approved material from the excavations, in backfilling in trenches, to specified density	m3	250
469	Imported material (free of stones), in backfilling in trenches, to specified density	m3	25
470	Bedding (sifted or imported soil free of stones, etc.), in trenches	m3	55
471	Surplus material from the excavations spread and levelled over the site as directed	m3	22
<u>SUNDRIES</u>			
472	Galvanised steel draw wires in sleeves	m	50

Carried to Collection

R

Section: 4
Bill No. 1
LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

473	Cable warning tape placed 150 mm above cables in excavations	m	620
474	Concrete cable slabs placed 150mm above cables in excavations	m	10
475	Cable route markers	No	8

Carried to Collection

R

Section: 4
 Bill No. 1
 LOW VOLTAGE DISTRIBUTION
BTKM QUANTITY SURVEYORS

Section: 4

Bill No. 1

LOW VOLTAGE DISTRIBUTION

COLLECTION

Total Brought Forward from Page No

**Page
No****Amount**

172

173

174

175

176

177

178

179

180

181

182

183

184

185

186

187

188

189

190

191

Carried Forward**R**

Section: 4

Bill No. 1

LOW VOLTAGE DISTRIBUTION

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<u>SECTION 4</u>			
<u>BILL No. 2</u>			
<u>SMALL POWER AND LIGHTING</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 160)</u>			
NOTICE TO TENDERERS:			
1 The tenderer for the principal contract shall submit additional information regarding the installer of the Electrical Installation together with the returnables enclosed with this part of the tender enquiry documents.			
2 The Contractor, on acceptance of his tender for the principal contract, shall submit within the period stated, the information indicated on the forms following immediately after the Summary of the bills of quantities for this installation.			
3 The Conditions of Contract and the application of Contract Price Adjustment Provisions (if applicable) shall be as set out in Part A: Section1: Preliminaries.			
4 The descriptions in these bills of quantities shall be read in conjunction with the specifications.			
5 The unit rate for each item in these bills of quantities shall include for all materials, labour, profit, transport, etc., necessary for the execution and complete installation of the work in accordance with the description.			
6 These bills of quantities shall not be used for ordering purposes. The Contractor shall check the lengths of cables on site as well as quantities of all other material before ordering any such material. Any allowance for off-cuts or waste shall be made in the unit rates.			
7 The rate shall exclude Value Added Tax and the total carried over to the final summary in Part A.			
8 All material covered by Specification shall, wherever possible, be of South African manufacture.			
Carried to Collection		R	
Section: 4			
Bill No. 2			
SMALL POWER AND LIGHTING			
BTKM QUANTITY SURVEYORS			

STANDARD SPECIFICATIONS

The follow standard specifications shall be read in conjunction with the project specifications and bills of quantities:

Section A - Preambles to Standard Specifications (PW 354)

Section B - Installation Specifications (PW 354) Section C - Quality Specifications for Materials and Equipment of Electrical Work Installations (September 2005)

SUPPLEMENTARY PREAMBLES

Items, materials or methods

Items, materials or methods to be used specified by trade names or catalogue numbers are only an indication of the quality required. The use of trade names for items, materials or methods shall also mean - or other approved - on the condition that prior approval is obtained from the Architect / Engineer.

REMOVAL OF EXISTING INSTALLATION

Disconnect and take out and remove all lighting and power outlets, complete with wiring to existing circuits, etc. and leave safe

- 1 All PVC insulated and bare copper wiring and cables from existing conduits or buried underground, all existing light fittings and other electrical equipment as indicated by the Engineer

Item

NEW INSTALLATIONS

CONDUIT

Black enamelled steel conduit, including cutting, bending and setting

20 mm Diameter

- | | | | |
|---|---|---|-------|
| 2 | Cast in concrete, surface bed or screed | m | 392 |
| 3 | Install in roofspace | m | 2,475 |
| 4 | Chase in brickwork | m | 1,105 |

Carried to Collection

R

Section: 4
Bill No. 2
SMALL POWER AND LIGHTING
BTKM QUANTITY SURVEYORS

-211-

<u>Surface mounted galvanised steel multi-way draw boxes, prices to include lock nuts and bushes</u>				
16	100 x 50 x 50 mm	No	16	
17	100 x 100 x 50 mm	No	16	
<u>WIRING CHANNELS</u>				
<u>Note:</u>				
The rates for wiring channels shall include for hangers, splices, jointing, drilling, etc.				
<u>Pre-galvanised steel channel, complete with cover, surface mounted to brickwork, concrete, steel, wood, etc. not exceeding 3 000 mm above floor level</u>				
18	127 mm x 76,2 mm Channel, manufactured from 0,8 mm thick steel (P9000)	m	906	
19	76,2 mm x 63,5 mm Channel, manufactured from 0,8 mm thick steel, complete with pre-drilled outlets for 5 A 3-pin sockets (P8300)	m	1,134	
<u>POWER SKIRTING</u>				
<u>Note:</u>				
The rates for power skirting shall include for splices, joining, drilling, etc				
<u>Two compartment power skirting with cover plates as specified</u>				
20	Power skirting	m	264	
21	End cap	No	42	
22	Internal Elbow	No	7	
<u>Single compartment power skirting with cover plates as specified</u>				
23	Power skirting	m	630	
24	End cap	No	80	
Carried to Collection				R
Section: 4				
Bill No. 2				
SMALL POWER AND LIGHTING				
BTM QUANTITY SURVEYORS				

	<u>Switches, etc complete with cover plate as required, fixed to power skirting, or power channel</u>		
25	16 A Three-pin switched socket outlet	No	197
26	13 A Dedicated switch socket outlet	No	209
27	Flush mounted 20 A 2-pole isolator with indicator light and cord grip	No	171
28	Data outlet (RJ45)	No	131
29	5 A Rectangular three-pin unswitched socket outlet	No	550

PVC CONDUCTORS

600/1 000 Volt grade PVC insulated conductor drawn into conduit, trunking or power skirting including wastage, tools & equipment

30	10 mm ²	m	3,600
31	6 mm ²	m	29,650
32	4 mm ²	m	91,151
33	2,5 mm ²	m	181.768

EARTH WIRES

Standard copper PVC insulated earth conductor in conduit or power skirting

34	6 mm ²	m	1,980
35	4 mm ²	m	15,994
36	2,5 mm ²	m	142,340

DRAW WIRES

Galvanised draw wire drawn into wireways

37	1,6mm Diameter	m	5,465
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LIGHT SWITCHES

Carried to Collection

Section: 4
Bill No. 2
SMALL POWER AND LIGHTING
BTKM QUANTITY SURVEYORS

R

Flush mounted light switches, including cover plates

38	16 A One-lever one-way switch	No	322
39	16 A Two-lever one-way switch	No	150
40	16 A Three-lever one-way switch	No	24
41	16 A One-lever Two-way switch	No	2
42	16 A Weatherproof rotary light switch, IP65 complete with box	No	2

SWITCH SOCKET OUTLETS AND ISOLATORS**Flush mounted switch socket outlets and isolators, including cover plates**

43	16 A Switch socket outlet plus Euro socket	No	100
44	10 A Circuit breaker plus 16 A Switch socket outlet and one Euro socket	No	140
45	5 A Rectangular three-pin unswitched socket outlet	No	24
46	5 A unswitched socket fitted in a 65 mm dia deep round box	No	829
47	30 A Double pole isolator (Toaster)	No	1
48	30 A Double pole isolator (Hand Drier)	No	10
49	30 A Double pole isolator (Equipment)	No	10
50	45 A Triple pole isolator (Equipment)	No	8
51	30 A Double pole isolator (Hydroboil)	No	1
52	45 A Triple pole isolator (Air Conditioner)	No	4
53	45 A Triple pole isolator (Server)	No	2
54	40 A Double pole isolator (380 V) (Bains Marie)	No	2
55	60 A Double pole isolator (Air Conditioner)	No	2
56	60 A Triple pole isolator (Air Conditioner)	No	8

Carried to Collection

R

Section: 4
 Bill No. 2
 SMALL POWER AND LIGHTING
BTKM QUANTITY SURVEYORS

57	60 A Triple pole isolator (Equipment)	No	5
58	80 A Triple pole isolator (Equipment)	No	1
<u>Surface mounted switch socket outlets, including cover plates</u>			
59	16 A Double switch socket outlet	No	12
60	30 A Double pole isolator (Air Conditioner)	No	10
61	45 A Triple pole isolator (Air Conditioner)	No	1
62	45 A Triple pole isolator (Hot Water Heat Pump)	No	3
63	30 A Double pole isolator (Air Conditioner)	No	2
64	30 A Double pole isolator (Hot Water Heat Pump)	No	3
65	45 A Triple pole isolator (Air Conditioner)	No	4
66	30 A Double pole isolator with bonding complete, including weatherproof enclosure (geyser)	No	42
67	45A Triple pole isolator, surface mounted	No	4
68	45 A Double pole isolator with bonding complete, including weatherproof enclosure	m	6
69	60 A Triple pole isolator (Hot Water Heat Pump)	No	9
70	60 A Triple pole isolator (Equipment)	No	2
<u>Special switches, etc complete with cover plates</u>			
<u>Rotary dimmer switch</u>			
71	16 A Rotary dimmer switch	No	4

LUMINAIRES AND EQUIPMENT

Carried to Collection

R

Section: 4
Bill No. 2
SMALL POWER AND LIGHTING
BTKM QUANTITY SURVEYORS

Luminaires or equipment complete with lamps, connections, etc. mounted in position All control gear to be of the electronic type

72	Type C: Industrial quality bulkhead luminaire designed for Industrial lighting, Public buildings and Utility applications. The luminaire consists of an aluminium housing and structured clear high impact acrylic diffuser. A wireguard to be included for additional vandal protection. The design to have LEDs of 19 W. SUPPLY	No	21
73	Type C: Industrial quality bulkhead luminaire designed for Industrial lighting, Public buildings and Utility applications. The luminaire consists of an aluminium housing and structured clear high impact acrylic diffuser. A wireguard to be included for additional vandal protection. The design to have LEDs of 19 W. INSTALL	No	21
74	Type D: High pressure die cast aluminium base and trim ring bulkhead fitting, complete with an opal high impact acrylic diffuser and 6 * 2,4 W LED lamp SUPPLY	No	7
75	Type D: High pressure die cast aluminium base and trim ring bulkhead fitting, complete with an opal high impact acrylic diffuser and 6 * 2,4 W LED lamp INSTALL	No	7
76	Type F4: Recessed LED panel light fitting, 600 mm x 1200 mm, with 1 x 53 W LED panel SUPPLY	No	138
77	Type F4: Recessed LED panel light fitting, 600 mm x 1200 mm, with 1 x 53 W LED panel INSTALL	No	138
78	Type F4e: Recessed LED panel light fitting, 600 mm x 1200 mm, with 1 x 53 W LED panel, v/w 1 hr emergency mode SUPPLY	No	50
79	Type F4e: Recessed LED panel light fitting, 600 mm x 1200 mm, with 1 x 53 W LED panel, v/w 1 hr emergency mode INSTALL	No	50

Carried to Collection

R

Section: 4
Bill No. 2
SMALL POWER AND LIGHTING
BTKM QUANTITY SURVEYORS

80	Type F7: Recessed LED panel, 600 mm x 600 mm, with 1 x 32 W LED lamp 8 SUPPLY	No	268	
81	Type F7: Recessed LED panel, 600 mm x 600 mm, with 1 x 32 W LED lamp 8 INSTALL	No	268	
82	Type F7e: Recessed LED panel, 600 mm x 600 mm, with 1 x 32 W LED panel, c/w 1 hr emergency mode SUPPLY	No	106	
83	Type F7e: Recessed LED panel, 600 mm x 600 mm, with 1 x 32 W LED panel, c/w 1 hr emergency mode INSTALL	No	106	
84	Type F9: Surface mounted, high quality, vapour proof fluorescent luminaire with 1 x 26 W LED lamp 84 SUPPLY	No	3	
85	Type F9: Surface mounted, high quality, vapour proof fluorescent luminaire with 1 x 26 W LED lamp 84 INSTALL	No	3	
86	Type F9e: Surface mounted, high quality, vapour proof fluorescent luminaire with 1 x 26 W LED lamp, c/w 1 hr emergency mode SUPPLY	No	11	
87	Type F9e: Surface mounted, high quality, vapour proof fluorescent luminaire with 1 x 26 W LED lamp, c/w 1 hr emergency mode INSTALL	No	11	
88	Type G: Bed light manufactured from Aluminium, coated with Dry Powder Polyester. Lens to be UV stabilised Clear Polycarbonate. Fitting c/w LED replacement for PL18 lamp. Fitting equal and similar to Eurolux W547:Ora wall light c/w 6W LED lamp SUPPLY	No	140	
89	Type G: Bed light manufactured from Aluminium, coated with Dry Powder Polyester. Lens to be UV stabilised Clear Polycarbonate. Fitting c/w LED replacement for PL18 lamp. Fitting equal and similar to Eurolux W547:Ora wall light c/w 6W LED lamp INSTALL	No	140	
Carried to Collection				R
Section: 4				
Bill No. 2				
SMALL POWER AND LIGHTING				
BTKM QUANTITY SURVEYORS				

90	Type J: Wall mounted security light manufactured from a Marine grade high-pressure die-cast aluminium body with non-discolouring polycarbonate protector, complete with 1 x 24 LED light source (with a nominal flux of 7676 lumen) SUPPLY	No	23	
91	Type J: Wall mounted security light manufactured from a Marine grade high-pressure die-cast aluminium body with non-discolouring polycarbonate protector, complete with 1 x 24 LED light source (with a nominal flux of 7676 lumen) INSTALL	No	23	
92	Type K: Decorative bulkhead light fitting manufactured from high pressure die cast aluminium, with high pressure die cast aluminium eyelid trim ring and clear prismatic high impact acrylic diffuser, complete with 1 x 8 W LED lamp SUPPLY	No	22	
93	Type K: Decorative bulkhead light fitting manufactured from high pressure die cast aluminium, with high pressure die cast aluminium eyelid trim ring and clear prismatic high impact acrylic diffuser, complete with 1 x 8 W LED lamp INSTALL	No	22	
94	Type M: Round LED bulkhead manufactured from high quality materials to ensure a high ingress protection and non-discolouring diffuser. The bulkhead to have a plug connector to easily separate the LED compartment from the base, to allow for easy installation. Complete with LEDs of 21 W SUPPLY	No	25	
95	Type M: Round LED bulkhead manufactured from high quality materials to ensure a high ingress protection and non-discolouring diffuser. The bulkhead to have a plug connector to easily separate the LED compartment from the base, to allow for easy installation. Complete with LEDs of 21 W INSTALL	No	25	
96	Type N: Washhand Basin Light Fitting manufactured from steel, c/w an Opal Plastic diffuser. Fitting to be c/w a 16 W Integrated LED. Fitting to be IP44 protected. 96 Fitting equal and similar to Eurolux W420: LED Imene bathroom wall light Aluminium chrome / white c/w 6 W LED lamp SUPPLY	No	164	
Carried to Collection				R
Section: 4				
Bill No. 2				
SMALL POWER AND LIGHTING				
BTKM QUANTITY SURVEYORS				

97	Type N: Washhand Basin Light Fitting manufactured from steel, c/w an Opal Plastic diffuser. Fitting to be c/w a 16 W Integrated LED. Fitting to be IP44 protected. 96 Fitting equal and similar to Eurolux W420: LED Imene bathroom wall light Aluminium chrome / white c/w 6 W LED lamp INSTALL	No	164	
98	Type P: Study light manufactured from Opal plastic ypsu, c/w 13 integrated LED lamp. Fitting equal and similar to Eurolux C286 13W LED light SUPPLY	No	140	
99	Type P: Study light manufactured from Opal plastic ypsu, c/w 13 integrated LED lamp. Fitting equal and similar to Eurolux C286 13W LED light INSTALL	No	140	
100	Type R: Recessed LED downlight consisting of a pressed metal ceiling trim, reflector, ceiling brackets and reinforced luminaire frame, colouring rendering index greater than 80, complete with 16 W neutral white LED lamp, including power supply and constant current driver unit SUPPLY	No	96	
101	Type R: Recessed LED downlight consisting of a pressed metal ceiling trim, reflector, ceiling brackets and reinforced luminaire frame, colouring rendering index greater than 80, complete with 16 W neutral white LED lamp, including power supply and constant current driver unit INSTALL	No	96	
102	Type Re: Recessed LED downlight consisting of a pressed metal ceiling trim, reflector, ceiling brackets and reinforced luminaire frame, colouring rendering index greater than 80, complete with 16 W neutral white LED lamp, including power supply and constant current driver unit, complete with 1 hour battery back-up SUPPLY	No	73	
103	Type Re: Recessed LED downlight consisting of a pressed metal ceiling trim, reflector, ceiling brackets and reinforced luminaire frame, colouring rendering index greater than 80, complete with 16 W neutral white LED lamp, including power supply and constant current driver unit, complete with 1 hour battery back-up INSTALL	No	73	
Carried to Collection				R
Section: 4				
Bill No. 2				
SMALL POWER AND LIGHTING				
BTKM QUANTITY SURVEYORS				

104	Type R1: Bathroom light. Recessed LED downlight manufactured from Die Cast Aluminium with a Frosted Glass lens. Fitting to be complete with a 5 W LED lamp. Fitting to be IP65 protected. Samsung electronics type KLM-HPSN-10W, or similar approved. SUPPLY	No	12
105	Type R1: Bathroom light. Recessed LED downlight manufactured from Die Cast Aluminium with a Frosted Glass lens. Fitting to be complete with a 5 W LED lamp. Fitting to be IP65 protected. Samsung electronics type KLM-HPSN-10W, or similar approved. INSTALL	No	12
106	Type R1e: Bathroom light as Type R1 above, c/w 1 hour emergency light SUPPLY	No	40
107	Type R1e: Bathroom light as Type R1 above, c/w 1 hour emergency light INSTALL	No	40
108	Type S: Ceiling mounted exit light manufactured from Polycarbonate with a Polycarbonate Protector. Light to be 3 hr Maintained 130 lumen output. Degree of Protection should be IP 43 with IK 04 Impact resistance. SUPPLY	No	72
109	Type S: Ceiling mounted exit light manufactured from Polycarbonate with a Polycarbonate Protector. Light to be 3 hr Maintained 130 lumen output. Degree of Protection should be IP 43 with IK 04 Impact resistance. INSTALL	No	72
<u>Shaver Sockets</u>			
110	110 / 220 V 3-pin shaver sockets c/w 20 VA isolating transformer	No	163
<u>Electric Wall Mounted Panel Heaters</u>			
111	750 W Wall mounted panel heater, c/w Thermostat and Cut Out switch	No	170
112	400 W Wall mounted panel heater, c/w Thermostat and Cut Out switch	No	1

Carried to Collection

R

Section: 4

Bill No. 2

SMALL POWER AND LIGHTING

BTKM QUANTITY SURVEYORS

ENERGY MANAGEMENT AND LIGHTING CONTROLS**LIGHTING CONTROLLERS AND RELAYS**

113	5512RVF 12 x 10 A Relay Unit, 200 mA Power Supply	No	2
114	5504RVF 4 x 10 A Relay Unit, 200 mA Power Supply	No	4

USER INTERFACE AND SYSTEM INPUT DEVICES

115	5085EDLW-PW 5 Key EDLT Input Unit, White Facia	No	1
116	5052NLWE Neo 2 Key Input Unit, White	No	1
117	5500NAC2 Network Automation controller	No	11
118	5000T2WB Black & White Touch Screen Wall Box	No	2
119	5753PEIRL Indoor Multi Sensor, 360o, Flush Mount	No	1
120	5753L Indoor Occupancy Sensor, Flush Mount, 360o	No	158
121	5751L Indoor Occupancy Sensor, 90o , Corner Mount	No	24
122	MAGNETS Magnetic door switches	No	1
123	L5504AUX 4 Channel Auxilliary Input Unit	No	4
124	5500PACA Pascal Logic Engine	No	2
125	5500NB Din Rail Mounted Network Bridge	No	6
126	5500PS Din Rail Mounted Power Supply, 350 mA	No	2
127	5031PEWP-GY Light Level Sensor	No	12

SYSTEM SETUP

128	5005C305B Cat 5, 4 Pair, UTP C-Bus Cable, 305 m	No	19
129	PROG-A Programming of Relay-, Switch- and Sensor Units	Item	
130	INSTALL Installation of Input Units and Termination of Cat 5 Cables	Item	

Carried to Collection

R

Section: 4

Bill No. 2

SMALL POWER AND LIGHTING

BTKM QUANTITY SURVEYORS

-222-

-223-

CONDUIT BOXES AND FITTINGS

Flush mounted galvanised steel multi-way draw boxes, prices to include lock nuts and bushes

Galvanised steel fixed onto conduit

149	100 x 100 x 50 mm	No	11
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Surface mounted galvanised steel multi-way draw boxes, prices to include lock nuts and bushes

150	100 x 100 x 50 mm	No	6
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Flush mounted socket outlets, including cover plates

151	Television and satellite socket outlet, mounted in a 100 x 100 x 50 mm box	No	18
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152	Data outlet (RJ45)	No	98
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Galvanised draw wire drawn into wireways

153	1,6 mm Diameter	m	686
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Manhole, comprising of 150 mm thick 25 Mpa/19 mm ref. 245 reinforced concrete base, one brick side walls inside plastered and 150 mm thick 25 Mpa/19 mm reinforced slab, reinforced with two Y12 reinforcing bars around opening for frame (cover/grate and frame elsewhere), including all necessary excavation, backfilling and compaction

154	Manhole, size 1 000 x 1 000 mm internally and exceeding 750 mm and not exceeding 1 250 mm deep internally	No	5
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155	Heavy duty Type CCP single seal manhole code 02100 size 450 x 600 mm x 117 kg	No	5
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Sleeves

156	50 mm Dia. PVC sleeve laid in trench in ground, excavation and backfilling measured elsewhere	m	36
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157	50 mm Dia. PVC 90o slow bend	No	6
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SUNDRIES

Carried to Collection

R

Section: 4
Bill No. 2
SMALL POWER AND LIGHTING
BTKM QUANTITY SURVEYORS

Earthing and Bonding

- 158 Earthing and bonding of the installation in accordance with SANS 10142 and as indicated in Section B11 of the Standard Electrical Specification PW354

Item

Labelling

- 159 Supply and installation of labels for cable ends and engraving of cover plates for light switches, socket outlets and isolators as specified

Item

Testing and commissioning

- 160 Allow for testing and commissioning of the complete electrical reticulation, lighting, small power and other electrical installations and earthing in terms of Section B15, Clause 2 of the Standard Electrical Specification (PW354) and handing over to the Engineer of fully completed Certificates of Compliance - one for each separate distribution board

Item

- 161 Submission and preparation of "As Built Drawings"

Item

Carried to Collection

R

Section: 4
Bill No. 2
SMALL POWER AND LIGHTING
BTKM QUANTITY SURVEYORS

Section: 4

Bill No. 2

SMALL POWER AND LIGHTING

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

209

210

211

212

213

214

215

216

217

218

219

220

221

222

223

224

225

Carried Forward to Summary of Section No: 4

R

Section: 4

Section: 1
Bill No. 2

SMALL POWER AND LIGHTING

BTKM QUANTITY SURVEYORS

Item
No

Quantity

Rate

Amount

SECTION 4

BILL No. 3

**LIGHTNING PROTECTION AND
EARTHING**

**(HAYLETT FORMULA WORK GROUP NO.
160)**

NOTICE TO TENDERERS:

1 The tenderer for the principal contract shall submit additional information regarding the installer of the Electrical Installation together with the returnables enclosed with this part of the tender enquiry documents.

2 The Contractor, on acceptance of his tender for the principal contract, shall submit within the period stated, the information indicated on the forms following immediately after the Summary of the bills of quantities for this installation.

3 The Conditions of Contract and the application of Contract Price Adjustment Provisions (if applicable) shall be as set out in Part A: Section1: Preliminaries.

4 The descriptions in these bills of quantities shall be read in conjunction with the specifications.

5 The unit rate for each item in these bills of quantities shall include for all materials, labour, profit, transport, etc., necessary for the execution and complete installation of the work in accordance with the description.

6 These bills of quantities shall not be used for ordering purposes. The Contractor shall check the lengths of cables on site as well as quantities of all other material before ordering any such material. Any allowance for off-cuts or waste shall be made in the unit rates.

7 The rate shall exclude Value Added Tax and the total carried over to the final summary in Part A.

8 All material covered by Specification shall, wherever possible, be of South African manufacture.

Carried to Collection

R

Section: 4
Bill No. 3
LIGHTNING PROTECTION AND EARTHING
BTKM QUANTITY SURVEYORS

STANDARD SPECIFICATIONS

The following standard specifications shall be read in conjunction with the project specifications and bills of quantities:

Section A - Preambles to Standard Specifications (PW 354)

Section B - Installation Specifications (PW 354)

Section C - Quality Specifications for Materials and Equipment of Electrical Work Installations (September 2005)

SUPPLEMENTARY PREAMBLES

Items, materials or methods

Items, materials or methods to be used specified by trade names or catalogue numbers are only an indication of the quality required. The use of trade names for items, materials or methods shall also mean - or other approved - on the condition that prior approval is obtained from the architect

Installation

LIGHTNING PROTECTION

Earth Electrode

Steel core reinforced copper rod complete with brass couplings

1	1 500 mm x 16 mm diameter earth electrode (250 micron copperweld) with driving cap, driven into ground to 500 mm below finished ground level SUPPLY	No	64
2	1 500 mm x 16 mm diameter earth electrode (250 micron copperweld) with driving cap, driven into ground to 500 mm below finished ground level INSTALL	No	64

Conduit boxes and fittings for test joints

Carried to Collection

R

Section: 4

Bill No. 3

LIGHTNING PROTECTION AND EARTHING

BTKM QUANTITY SURVEYORS

<u>Wall boxes, as specified, placed in position for casting into concrete, built into or chased into brickwork or surface mounted including locknut and bushes</u>					
3	50 mm Brass coupling test joint in recessed or surface mounted 100 x 100 x 100 mm outlet box complete with steel blank cover plate, as specified SUPPLY	No	56		
<u>Conductors</u>					
4	50 mm ² PVC insulated copper earth conductor drawn into conduit SUPPLY	m	97		
5	50 mm ² PVC insulated copper earth conductor drawn into conduit INSTALL	m	97		
6	8 mm Dia. bare aluminium alloy conductor installed on wall with fixing brackets at max 600 mm centres (vertical) SUPPLY	m	259		
7	8 mm Dia. bare aluminium alloy conductor installed on wall with fixing brackets at max 600 mm centres (vertical) INSTALL	m	259		
8	8 mm Dia. Bare aluminium alloy conductor with brackets at maximum 600 mm centres mounted on roof ridges ('ridge conductor') SUPPLY	m	206		
9	8 mm Dia. bare aluminium alloy conductor installed on wall with fixing brackets at max 600 mm centres (vertical) INSTALL	m	206		
<u>Steel conduit: conduit, prices to include cutting, bending and setting</u>					
<u>25 mm Diameter</u>					
10	Fixed to brickwork	m	62		
11	Fixed to steelwork	m	5		
Carried to Collection				R	
Section: 4					
Bill No. 3					
LIGHTNING PROTECTION AND EARTHNING					
BTKM QUANTITY SURVEYORS					

Roof to gutter, roof to roof interconnections

12	50 mm ² Aluminium conductor in short lengths not exceeding 600 mm in connection between roof and guttering, including brass bolts and nuts	No	49
13	50 mm ² Aluminium conductor in short lengths 600 mm but not exceeding 1 500 mm in connection between roof and roof, including brass bolts and nuts	No	57

General earth bonding

14	Bonding of metal drainage/water down pipes	Item	
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Testing and commissioning

15	Testing of joint continuity	Item	
16	Testing of lightning protection system	Item	
17	Testing of earthing points	Item	
18	Issue certificate of compliance	Item	

Carried to Collection

R

Section: 4
Bill No. 3
LIGHTNING PROTECTION AND EARTHING
BTKM QUANTITY SURVEYORS

Section: 4

Bill No. 3

LIGHTNING PROTECTION AND EARTHING

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

227

228

229

230

Carried Forward to Summary of Section No: 4

R

Section: 4

Bill No. 3

LIGHTNING PROTECTION AND EARTHING

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<p><u>SECTION 4</u></p> <p><u>BILL No. 4</u></p> <p><u>FIRE DETECTION</u></p> <p><u>(HAYLETT FORMULA WORK GROUP NO. 160)</u></p> <p>NOTICE TO TENDERERS:</p> <p>1 The tenderer for the principal contract shall submit additional information regarding the installer of the Electrical Installation together with the returnables enclosed with this part of the tender enquiry documents.</p> <p>2 The Contractor, on acceptance of his tender for the principal contract, shall submit within the period stated, the information indicated on the forms following immediately after the Summary of the bills of quantities for this installation.</p> <p>3 The Conditions of Contract and the application of Contract Price Adjustment Provisions (if applicable) shall be as set out in Part A: Section1: Preliminaries.</p> <p>4 The descriptions in these bills of quantities shall be read in conjunction with the specifications.</p> <p>5 The unit rate for each item in these bills of quantities shall include for all materials, labour, profit, transport, etc., necessary for the execution and complete installation of the work in accordance with the description.</p> <p>6 These bills of quantities shall not be used for ordering purposes. The Contractor shall check the lengths of cables on site as well as quantities of all other material before ordering any such material. Any allowance for off-cuts or waste shall be made in the unit rates.</p> <p>7 The rate shall exclude Value Added Tax and the total carried over to the final summary in Part A.</p> <p>8 All material covered by Specification shall, wherever possible, be of South African manufacture.</p>			
<p style="text-align: right;">Carried to Collection</p> <p>Section: 4 Bill No. 4 FIRE DETECTION BTKM QUANTITY SURVEYORS</p>			<p style="text-align: center;">R</p>

STANDARD SPECIFICATIONS

The following standard specifications shall be read in conjunction with the project specifications and bills of quantities:

Section A - Preambles to Standard Specifications (PW 354)

Section B - Installation Specifications (PW 354)

Section C - Quality Specifications for Materials and

Equipment of Electrical Work Installations (September 2005)

SUPPLEMENTARY PREAMBLES**Items, materials or methods**

Items, materials or methods to be used specified by trade names or catalogue numbers are only an indication of the quality required. The use of trade names for items, materials or methods shall also mean - or other approved - on the condition that prior approval is obtained from the architect

FIRE DETECTION (PRELIMINARY)**ADDRESSABLE FIRE PANEL**

1	256 Zone Addressable Fire Panel	No	1
2	4 Zone Addressable Fire Panel	No	1

OPTICAL SMOKE DETECTOR

3	Optical Smoke Detector	No	271
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SOUNDER / STROBE LIGHT

4	Sounder / Strobe Light	No	21
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FIRE BREAK GLASS UNIT

5	Fire Break Glass Unit	No	35
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24 V POWER SUPPLY

6	24 Volt Power Supply	No	2
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HEAT DETECTORS

7	Heat Detectors	No	2
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Carried to Collection

R

Section: 4

Bill No. 4

FIRE DETECTION

BTKM QUANTITY SURVEYORS

<u>ALARM SOUNDER</u>				
8	Alarm Sounder	No	2	
<u>CABLING</u>				
<u>CONDUIT</u>				
<u>PVC conduit, including cutting, bending and setting</u>				
<u>25 mm Diameter</u>				
9	Install in roofspace	m	1,780	
10	Chase in brickwork	m	60	
11	Installed on brickwork or sheet metal	m	205	
<u>CONDUIT BOXES AND FITTINGS</u>				
<u>Surface mounted PVC multi-way draw boxes, prices to include lock nuts and bushes and blank cover plate</u>				
12	100 x 100 x 50 mm	No	486	
<u>Galvanised draw wire drawn into wireways</u>				
13	1,6 mm Diameter	m	1,380	
<u>CABLING</u>				
14	Fire Resistant Cable PH30 (2*1,0 mm) - 30 min Fire Resistant	m	2,360	
15	Connection of PH30 cable	No	767	
<u>TESTING AND COMMISSIONING</u>				
16	Testing and Commissioning			SUM
17	Certificate of Compliance	No	1	
18	Training of Relevant Personnel			SUM
19	Operating and Maintenance Manuals	Sets	3.0	
Carried to Collection				R
Section: 4				
Bill No. 4				
FIRE DETECTION				
BTKM QUANTITY SURVEYORS				

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Section: 4

Bill No. 4

FIRE DETECTION

COLLECTION

Total Brought Forward from Page No

Page
No

232

233

234

235

Amount

Carried Forward to Summary of Section No: 4

R

Section: 4

Bill No. 4

FIRE DETECTION

BTKM QUANTITY SURVEYORS

Item No		Quantity	Rate	Amount
	<u>SECTION 4</u>			
	<u>BILL No. 5</u>			
	<u>DIESEL GENERATORS</u>			
	<u>Supply, Deliver, install and commissioning of standby generator complete in canopy as specified for the following sizes:</u>			
1	300 KVA Diesel generator set on a "Duplex" frame Enclosed (3Ph) (Including first fill of all lubrication, oils and diesel)as per attached specification	No	1	
2	300 KVA Diesel generator set on a "Duplex" frame as per attached specification (Generator 2), Ditto.	No	1	
3	Design supply and install the stainless steel exhaust silencer for the mentioned generator, including lagging:	No	1	
4	Supply and install a concrete plinth according to the specifications and drawing.	m3	5	
5	Supply and Install warning notices on the container as specified.		Item	
6	Set of Warning Notices as per SANS and OHS specifications.		Item	
7	Compilation of Maintenance, operational and technical Manuals to the client satisfaction. (Supply manuals)		Item	
	<u>Test and Commission to deliver a fully operational generating set to the client and engineers satisfaction</u>			
8	At the suppliers premises, prior to delivery to site		Item	
9	On site after completion of the installation		Item	
10	12 Month maintenance as per the specification. Quarterly (4) service of the plant as per the manufacturer's requirements.		Item	
11	Supply and install A82 padlocks.	No	5	
	Carried Forward to Summary of Section No: 4		R	
	Section: 4			
	Bill No. 5			
	STANDBY DIESEL GENERATORS			
	BTKM QUANTITY SURVEYORS			

Bill No	<u>SECTION SUMMARY - Section No 4: Electrical Installation</u>	Page No	Amount
1	LOW VOLTAGE DISTRIBUTION	208	
2	SMALL POWER AND LIGHTING	226	
3	LIGHTNING PROTECTION AND EARTHNING	231	
4	FIRE DETECTION	236	
5	STANDBY DIESEL GENERATORS	237	
	Carried to Final Summary		R
Section: 4	BTKM QUANTITY SURVEYORS		

SECTION NO 5:
MECHANICAL INSTALLATION

-239-

	<u>Water supply pipes</u>			
4	100mm Diameter pipe with and including necessary concrete anchor blocks with pre-rolled anchor strap (50mm) with butynol rubber membrane between pipe and strap supported with 50 x 50 x 5mm gusset plate fixed with 2 x M12 cast-in or stainless steel bolts at each side of pipe	m	84	
5	200mm Diameter	m	22	
6	Extra over for 100mm diameter isolating valve with flanged connections	No	2	
7	Ditto, but 200mm Diameter, ditto	No	1	
8	100mm Diameter non-return valve, ditto	No	3	
9	100mm Diameter strainer, ditto	No	1	
10	200 Litre pressure vessel	No	1	
11	100mm Diameter T-connection with flanged connections	No	3	
12	100mm Diameter 90 degree elbow, ditto	No	5	
13	100mm Diameter scour, ditto	No	1	
14	100mm Diameter unions, ditto	No	8	
	<u>Watermeter, etc.</u>			
15	Elster Kent or other similar approved inline pulse water meter	No	1	
	<u>PUMPS, ETC.</u>			
16	Hydro MPC-S 3 CR32-3 or other similar approved domestic and fire pumpset (duty and standby) with pressure guages and switches		Item	
	<u>Painting and labelling of all fire pipework as per SANS 10252 and SANS 10140.</u>			
17	Steel pipes	m ²	40	
	Carried to Collection			R
	Section: 5 Bill No. 1 FIRE RETICULATION BTKM QUANTITY SURVEYORS			

TESTING AND COMPLETION

18 Test and commission entire fire installation as required by
SANS 10400 and SANS 10287

SUM

Carried to Collection

R

Section: 5
Bill No. 1
FIRE RETICULATION
BTKM QUANTITY SURVEYORS

Section: 5

Bill No. 1

FIRE RETICULATION

COLLECTION

Total Brought Forward from Page No

**Page
No**

Amount

239

240

241

Carried Forward to Summary of Section No: 5

R

Section: 5

Bill No. 1

FIRE RETICULATION

BTKM QUANTITY SURVEYORS

Section: 5
Bill No. 2
KITCHEN EQUIPMENT
BTKM QUANTITY SURVEYORS

Carried to Collection

Section: 5
Bill No. 2
KITCHEN EQUIPMENT
BTKM QUANTITY SURVEYORS

30	1650 x 750 x 910 Stainless Steel Table with splashback, undershelf and 900 x 400 mm Polypropylene Cutting Board	No	1	
31	1650 x 750 x 910 Stainless Steel Table with splashback and undershelf	No	3	
32	2250 x 750 x 910 Stainless Steel Table with splashback and undershelf	No	7	
33	Industrial Bread Slicer (8 - 16 mm Slice Thickness)	No	1	
34	1785 x 750 x 910 Stainless Steel Counter with undershelf	No	2	
35	1105 x 750 x 910 Stainless Steel Counter with undershelf	No	1	
36	1050 x 750 x 910 Stainless Steel Table with splashback and undershelf	No	5	
<u>Review, provide information to the engineer regarding the condition of the existing equipment, service and repair equipment on approval of engineer</u>				
37	Industrial Upright Dishwasher	No	1	
38	Oil Jacketed Boiling Pot 135 L (Phutu Pot)	No	1	
39	10 Pan Convection	No	1	
Carried to Collection				R
Section: 5				
Bill No. 2				
KITCHEN EQUIPMENT				
BTKM QUANTITY SURVEYORS				

COLLECTION

245

R

BTKM QUANTITY SURVEYORS

Item No	Quantity	Rate	Amount
<u>SECTION 5</u>			
<u>BILL No. 3</u>			
<u>HVAC INSTALLATION, ETC.</u>			
<u>(HAYLETT FORMULA WORK GROUP NO. 170)</u>			
<u>Heating and Air Conditioning</u>			
<u>Design, manufacture, works testing, supply and delivery to site, moving into position, erection, connecting up, site testing, witness testing, proving to the inspectors, demonstrating to the Employer and maintenance of the complete installation as outlined in the specification and on the drawings.</u>			
<u>Installation and Commissioning of air conditioning units and ducting must include for all hangers, support, condensate drains and trunking.</u>			
<u>All items on the Bill are re-measurable.</u>			
<u>Split Unit</u>			
<u>Supply and installation of split air-conditioner unit complete with matching condensing (outdoor) unit and rigging into position. Including remote control, insulated piping between indoor and outdoor portions of unit, anti-vibration wall mounting brackets, condensate drain pumps and all necessary accessories. Split unit shall be of the inverter type and the manufacturers brand subject to the engineers approval prior to procurement.</u>			
1	Split Unit, Cooling capacity 2,6 kW, Midwall unit	No	6
2	Split Unit, Cooling capacity 3,5 kW, Midwall unit	No	2
3	Split Unit, Cooling capacity 7,0 kW, Midwall unit	No	2
4	Split Unit, Cooling capacity 16,1 kW, Underceiling unit	No	8
Carried to Collection			R
Section: 5 Bill No. 3 HVAC BTKM QUANTITY SURVEYORS			

5	Trunking 75 x 75 mm to match interior and exterior for piping and cabling	m	31	
6	PVC Condensation Piping 20 mm complete with insulation	m	31	
7	Commissioning of installation as per SANS, engineers specifications, manufacturer's instructions and specifications	No	18	
8	Servicing of Split Unit, Cooling capacity 7,0 kW, Midwall unit	No	1	
<u>Fresh Air Ventilation</u>				
<u>Design, manufacture, works testing, supply and delivery to site, moving into position, erection, connecting up, site testing, witness testing, proving to the inspectors, demonstrating to the Employer and maintenance of the complete installation as outlined in the specification and on the drawings.</u>				
<u>All items on the Bill are re-measurable.</u>				
<u>Fans</u>				
<u>Supply and installation of fans complete with mounting brackets and anti-vibration mounts.</u>				
9	Axial fans: Duct mounted Fresh air silent duct mounted axial fan, Ø500 mm, 522 - 534 l/s at 150 Pa	No	2	
10	Fresh air silent duct mounted axial fan, Ø150 mm, 76 l/s at 150 Pa	No	1	
11	Fresh air silent duct mounted axial fan, Ø250 mm, 220 - 240 l/s at 150 Pa	No	1	
12	Axial fans: Wall mounted Fresh air silent wall mounted axial fan, 200 mm x 200 mm, 36 l/s at 50 Pa	No	1	
<u>Sound Attenuators</u>				
<u>Supply and installation of POD type sound attenuators with NC rating of 35, flexible collars and complete with mounting brackets.</u>				
13	Cylindrical attenuator, Ø500 mm, Length 2D	No	4	
Carried to Collection				R
Section: 5 Bill No. 3 HVAC BTKM QUANTITY SURVEYORS				

Ducting**Uninsulated galvanised sheet metal ducting**
Supply and installation of galvanised sheet metal ducting
including supports and fixings.

14	Catergory 1	m2	32
15	Round Spiral ducting, Ø150	m	17
16	Round Spiral ducting, Ø200	m	7
17	Round Spiral ducting, Ø250	m	31
18	Round Spiral ducting, Ø300	m	17

Uninsulated galvanised sheet metal duct fittings
Supply and installation of galvanised sheet metal duct
fittings including supports and fixings.

19	Uninsulated galvanised sheet metal duct bends Duct bend, category 1	No	2
20	Duct bend, Ø150	No	1
21	Duct bend, Ø200	No	5
22	Duct bend, Ø250	No	1
23	Duct bend, Ø300	No	3
24	Uninsulated galvanised sheet metal duct transformations Duct transformation, category 1	No	2
25	Uninsulated galvanised sheet metal duct stop ends Duct stop end, category 1	No	2
26	Duct stop end, Ø300	No	2
27	Duct shoe piece, Ø150	No	3
28	Duct shoe piece, Ø250	No	8

Carried to Collection

R

Section: 5

Bill No. 3

HVAC

BTKM QUANTITY SURVEYORS

<u>Flexible ducting</u>				
<u>Supply and installation of flexible ducting, 1500mm long c/w clamps.</u>				
29	Insulated acoustic flexible ducting Insulated acoustic flexible duct, Ø150	No	3	
30	Insulated acoustic flexible duct, Ø200	No	2	
31	Insulated acoustic flexible duct, Ø250	No	8	
<u>Uninsulated galvanised sheet metal discharge cowl</u>				
32	Discharge cowl, Ø500 mm, complete with wire mesh and washable pleated filters	No	2	
33	Discharge cowl, Ø200 mm, complete with wire mesh and washable pleated filters	No	2	
34	Discharge cowl, Ø300 mm, complete with wire mesh and washable pleated filters	No	2	
<u>Supply ceiling-mounted diffusers</u>				
35	One way supply air grille, 1000x350 mm faceplate, Ø250 mm connection, powder coated to architects specification	No	8	
36	One way supply air grille, 300x300 mm faceplate, Ø200 mm connection, powder coated to architects specification	No	2	
37	One way supply air grille, 200x200 mm faceplate, Ø150 mm connection, powder coated to architects specification	No	3	
<u>Door Grilles</u>				
<u>Supply and installation of door grilles, which are epoxy coated to architect specification colour.</u>				
38	Door Grille, 450 mm x 450 mm	No	42	
39	Commissioning of installation as per SANS, engineers specifications, manufacturer's instructions and specifications			SUM
<u>Extraction Air Ventilation</u>				
Carried to Collection				R
Section: 5				
Bill No. 3				
HVAC				
BTM QUANTITY SURVEYORS				

Design, manufacture, works testing, supply and delivery to site, moving into position, erection, connecting up, site testing, witness testing, proving to the inspectors, demonstrating to the Employer and maintenance of the complete installation as outlined in the specification and on the drawings.

All items on the Bill are re-measurable.

Fans

Supply and installation of fans complete with mounting brackets and anti-vibration mounts.

40	Axial fans: Duct mounted Vertical encased extract air silent duct mounted axial fan, Ø900 mm, 3700 l/s at 200 Pa, suitable for kitchen extraction	No	1
41	Vertical encased extract air silent duct mounted axial fan, Ø630 mm, 1855 l/s at 200 Pa, suitable for kitchen extraction	No	1
42	Axial fans: Wall mounted Extract air silent wall mounted axial fan, Ø250 mm, 220 l/s at 50 Pa	No	25
43	Extract air silent wall mounted axial fan, Ø200 mm, 26 - 49 l/s at 50 Pa	No	14
44	Extract air silent wall mounted axial fan, Ø220 mm, 78 - 120 l/s at 50 Pa	No	5

Sound Attenuators

Supply and installation of POD type sound attenuators with NC rating of 30, flexible collars and complete with mounting brackets.

45	Cylindrical attenuator, Ø900 mm, Length 1,5D	No	2
46	Cylindrical attenuator, Ø630 mm, Length 1,5D	No	2

Ducting

Uninsulated galvanised sheet metal ducting

Supply and installation of galvanised sheet metal ducting including supports and fixings.

47	Round Spiral ducting, Ø630	m	3
48	Round Spiral ducting, Ø900	m	3

Carried to Collection

Section: 5

Bill No. 3

HVAC

BTKM QUANTITY SURVEYORS

R

49	Uninsulated galvanised sheet metal duct transformations Duct transformation, Ø630	No	2	
50	Duct transformation, Ø900	No	2	
<u>Terminals</u>				
<u>Constant Volume Terminals</u>				
<u>Supply and installation of constant air volume terminals, which are epoxy coated to architect specification colour.</u>				
<u>Weather Louvres</u>				
<u>Supply and install powder coated louvre with hinged washable pleated filter.</u>				
51	Weather Louvre, 2500 mm x 700 mm	No	1	
<u>Door Grilles</u>				
<u>Supply and installation of door grilles, which are epoxy coated to architect specification colour.</u>				
52	Door Grille, 250 mm x 250 mm	No	11	
53	Door Grille, 450 mm x 450 mm	No	26	
54	Door Grille, 300 mm x 300 mm	No	5	
<u>Kitchen Canopy</u>				
<u>Stainless steel 304 type extraction canopy complete with baffle type grease filters, grease traps, grease drains and vapour proof light fittings</u>				
55	4600 x 3300 mm - Island type	No	1	
56	3700 x 1200 mm - Wall type	No	1	
57	Commissioning of installation as per SANS, engineers specifications, manufacturer's instructions and specifications			SUM
<u>Dehumidification</u>				
Design, manufacture, works testing, supply and delivery to site, moving into position, erection, connecting up, site testing, witness testing, proving to the inspectors, demonstrating to the Employer and maintenance of the complete installation as outlined in the specification and on the drawings.				
Carried to Collection				R
Section: 5				
Bill No. 3				
HVAC				
BTKM QUANTITY SURVEYORS				

Dehumidifiers

Supply, installation and commissioning of dehumidifier units. Units are to be single phase power, contain a humidification rate control setting, contain a storage water tank and be capable of connecting to a drainage point.

- 58 Dehumidifier, floor free standing, with drainage pipe option and water tank, 20 l/24 hours, 145 m³/h

No

2

Cold Room and Freezer Room

Design, manufacture, works testing, supply and delivery to site, moving into position, erection, connecting up, site testing, witness testing, proving to the inspectors, demonstrating to the Employer and maintenance of the complete installation as outlined in the specification and on the drawings.

All items on the Bill are re-measurable.

Cold Room

Complete supply, installation and commissioning of cold room complete with shell, ramp into room, vapour barriers, door with safety handles(heater type where require), lights, Evaporative and condensing units(air cooled, refrigerant piping, drain piping, controls, thermostats, temperature guages, vaccum release valves, shelving and rails where required etc.

- 59 Cold room, 10.0 m², height 3.0 m. Scroll compressor condensing unit, Cooling capacity 3.2 kW, suitable for outdoor installation. Cold room blower (evaporator) fan, Cooling capacity 3.0 kW, Flow rate 834 l/s. Factory fabricated modular panels, polyphen insulation 100mm thick, density 24 kg/m³. Operating temperature 2°C.

SUM

- 60 Conduct evaluation of existing Cold room, 10.0 m², height 3,0 m and provide Engineer with report on condition of existing cold room and carry out necessary repairs as instucted by Engineer

SUM

Carried to Collection

R

Section: 5

Bill No. 3

HVAC

BTKM QUANTITY SURVEYORS

Freezer Room

Complete supply, installation and commissioning of Freezer room complete with shell, ramp into room, vapour barriers, door with safety handles(heater type where require), lights, Evaporative and condensing units(air cooled, refrigerant piping, drain piping, controls, thermostats, temperature guages, vaccum release valves, shelving and rails where required etc.

- 61 Freezer room, 7.0 m², height 3.0 m. Scroll compressor condensing unit, Cooling capacity 3.7 kW, suitable for outdoor installation. Freezer room blower (evaporator) fan, Cooling capacity 4.0 kW, Flow rate 1668 l/s. Factory fabricated modular panels, polyphen insulation 100mm thick, density 24 kg/m³. Operating temperature -20°C.

SUM

Carried to Collection

R

Section: 5

Bill No. 3

HVAC

BTKM QUANTITY SURVEYORS

Section: 5

Bill No. 3

HVAC

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

247

248

249

250

251

252

253

254

Carried Forward to Summary of Section No: 5

R

Section: 5

Bill No. 3

HVAC

BTKM QUANTITY SURVEYORS

[illegible]

-257-

-258-

Section: 5

Bill No. 4

GAS INSTALLATION

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

256

257

258

Carried Forward to Summary of Section No: 5

R

Section: 5

Bill No. 4

GAS INSTALLATION

BTKM QUANTITY SURVEYORS

Item No		Quantity	Rate	Amount
<u>SECTION 5</u>				
<u>BILL No. 5</u>				
<u>WETS SERVICES, ETC.</u>				
<u>(HAYLETT FORMULA WORK GROUP NO. 170)</u>				
<u>PLUMBING: COLD WATER AND HOT WATER</u>				
<u>Supply and install SABS 460 Class 2, pipes, fittings, saddles, bracketing and accessories fixed to soffit and walls, or as described in accordance with the manufacturer's specification complete with labour. Size indicated is the Pipes Norminal Diamter in mm. All items are remeasurable.</u>				
<u>Chased into Wall Pipes</u>				
1	Ø 15 mm Pipe	m	150	
2	Ø 22 mm Pipe	m	36	
3	Ø 28 mm Pipe	m	36	
<u>Surface Mounted Pipes</u>				
4	Ø 15 mm Pipe	m	468	
5	Ø 22 mm Pipe	m	421	
6	Ø 28 mm Pipe	m	254	
7	Ø 35 mm Pipe	m	36	
8	Ø 42 mm Pipe	m	21	
9	Ø 54 mm Pipe	m	6	
<u>Bends</u>				
10	Ø 15 mm	No	695	
Carried to Collection				R
Section: 5				
Bill No. 5				
WETS SERVICES				
BTKM QUANTITY SURVEYORS				

11	Ø 22 mm	No	96
12	Ø 28 mm	No	89
13	Ø 42 mm	No	5
<u>Equal Tees</u>			
14	Ø 15 mm	No	117
15	Ø 22 mm	No	21
16	Ø 28 mm	No	1
17	Ø 35 mm	No	1
<u>Tees</u>			
18	Ø 54mm Tee with to Ø 28mm Branch	No	6
19	Ø 42mm Tee with to Ø 28mm Branch	No	10
20	Ø 42mm Tee with to Ø 22mm Branch	No	5
21	Ø 42mm Tee with to Ø 15mm Branch	No	1
22	Ø 35mm Tee with to Ø 28mm Branch	No	11
23	Ø 35mm Tee with to Ø 22mm Branch	No	25
24	Ø 35mm Tee with to Ø 15mm Branch	No	4
25	Ø 28mm Tee with to Ø 22mm Branch	No	40
26	Ø 28mm Tee with to Ø 15mm Branch	No	3
27	Ø 22mm Tee with to Ø 15mm Branch	No	55
<u>Reducers</u>			
28	Ø 54mm to Ø 42mm	No	5
29	Ø 42mm to Ø 35mm	No	6
30	Ø 42mm to Ø 15mm	No	2

Carried to Collection

R

Section: 5
Bill No. 5
WETS SERVICES
BTM QUANTITY SURVEYORS

31	Ø 35mm to Ø 28mm	No	7
32	Ø 35mm to Ø 22mm	No	3
33	Ø 35mm to Ø 15mm	No	1
34	Ø 35mm to Ø 15mm	No	
35	Ø 28mm to Ø 22mm	No	102
36	Ø 28mm to Ø 15mm	No	1
37	Ø 22mm to Ø 15mm	No	126
<u>Supply and install lever ball valve, including connection fittings to piping:</u>			
38	Ø 15 mm	No	171
39	Ø 22 mm	No	51
40	Ø 28 mm	No	77
41	Ø 35 mm	No	22
42	Ø 54 mm	No	6
<u>Sanitary connection equipment to include all neccessary fittings to facilitate connection between supply pipe and sanitary fitting, to facilate correct working of sanitaryware. Any exposed fittings to be approved by the architect. The sanitary schedule is in the main bill.</u>			
43	Wash Basin - Ø 15 mm	No	364
44	Toilet - Ø 15 mm	No	47
45	Urinal - Ø 15 mm	No	15
46	Showers - Ø 15 mm	No	64
47	Sinks - Ø 15 mm	No	18
48	Taps - Ø 15 mm	No	17

Carried to Collection

R

Section: 5
Bill No. 5
WETS SERVICES
BTKM QUANTITY SURVEYORS

<u>Supply and Install Insulation</u>			
49	Ø 15 mm	No	155
50	Ø 22 mm	No	137
51	Ø 28 mm	No	31
<u>Allow for adapter for HDPE to copper pipe, and wrapped with high adhesive petroleum tape throughout portion which is underground.</u>			
52	Ø 15 mm	No	1
53	Ø 22 mm	No	6
54	Ø 35 mm	No	24
55	Ø 42 mm	No	1
56	Ø 54 mm	No	5
57	Testing and commissioning of water systems, including 5% pressure test.		
			SUM
<u>HOT WATER EQUIPMENT</u>			
<u>Supply, install and commission hot water cylinder complete with electric back up element, drip tray with P traps, multi-control valve and all necessary accessories. All products and installations are to be in accordance to SANS 151, SANS 347 and SANS 10254.</u>			
58	HWC - 200 Litres, 600kPa cylinder	No	33
59	POU - 10 Litres	No	70
<u>Supply, install and commission heat pump complete with all the necessary accessories for the complete functioning of the hot water heating and circulation system.</u>			
60	Heat pump - 11,1 kW	No	10
61	Heat pump - 3,85 kW	No	3
62	Testing and commissioning of hot water system in the presence of the manufacturer.		
			SUM
Carried to Collection			R
Section: 5			
Bill No. 5			
WETS SERVICES			
BTKM QUANTITY SURVEYORS			

PLUMBING: DRAINAGE

Supply and install uPVC pipes and fittings, in accordance with the manufacturers approved installation procedure complete with labour, saddles, bracketing and accessories. All items are remeasurable.

Piping

63	Ø 50 mm Pipe	m	673
64	Ø 110 mm Pipe	m	180

Bends

65	Ø 50 mm	No	39
66	Ø 50 mm with inspection eye	No	120
67	Ø 110 mm with inspection eye	No	27
68	Ø 50 mm 45°	No	1
69	Ø 50 mm 45°	No	

Equal Tees

70	Ø 50 mm	No	138
71	Ø 50 mm with inspection eye	No	20
72	Ø 110 mm	No	66

Unequal Tees

73	Ø 110 mm Tee with Ø 50 mm Branch with inspection eye	No	11
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Reducers

74	Ø 110 mm to Ø 50 mm	No	16
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Venting

75	Ø 50 mm vent cowl	No	48
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Carried to Collection

R

Section: 5
Bill No. 5
WETS SERVICES
BTKM QUANTITY SURVEYORS

Traps

76	50 mm "Flexi Trap" P or S type trap jointed to waste pipe including connection or clamp etc	No	205
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Miscellaneous connectors

77	Ø 110 mm straight pan connector	No	45
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78	Ø 50 mm double junction	No	10
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Carried to Collection

R

Section: 5
Bill No. 5
WETS SERVICES
BTKM QUANTITY SURVEYORS

Section: 5

Bill No. 5

WETS SERVICES

COLLECTION

Total Brought Forward from Page No

Page
No

Amount

260

261

262

263

264

265

Carried Forward to Summary of Section No: 5

R

Section: 5

Bill No. 5

WETS SERVICES

BTKM QUANTITY SURVEYORS

**Bill
No**

Amount

Page
No

1	FIRE RETICULATION
2	KITCHEN EQUIPMENT
3	HVAC
4	GAS INSTALLATION
5	WETS SERVICES

242

246

255

259

266

Carried to Final Summary

R

BTKM QUANTITY SURVEYORS

EPWP/NYS

Item No	Quantity	Rate	Amount
<u>SECTION 6</u>			
<u>BILL NO. 1</u>			
<u>EPWP - NYS & CONTRACT PARTICIPATION GOAL</u>			
<u>EMPLOYMENT AND TRAINING OF LABOUR ON THE EPWP-NYS INFRASTRUCTURE PROJECTS</u>			
<u>PREAMBLES</u>			
Tenderers are advised to study the Additional Specification SL: Employment and Training of Labour on the Expanded Public Works Programme (EPWP) Infrastructure Projects: National Youth Service, as bound elsewhere in the Bills of Quantities, and then price this Bill accordingly.			
<u>TRAINING OF YOUTH WORKERS</u>			
<u>TARGET 68 YOUTH WORKERS</u>			
<u>Skills development and technical training:</u>			
1	Item		1,500,000.00
Skills development and technical training for youth workers for an average of 66 days per youth worker (ref .SL 11.01.01)			
2	Item		
Payment Reduction due to not meeting the target as in SL 11.01(-R2500/youth worker/month)			
3	Item		
Profit and attendance on above (10%)			
<u>EMPLOYMENT OF YOUTH WORKERS</u>			
4	Item		1,450,000.00
Employment of youth workers (ref. SL 11.02.01)			
5	Item		
Profit and attendance on above (ref. SL 11.02.02)(10%)			
Carried to Collection			R
Section: 6			
Bill No. 1			
EPWP - NYS			
BTKM QUANTITY SURVEYORS			

**PROVISION OF EPWP DESIGNED OVERALLS
AND HARD HATS TO YOUTH WORKERS**

- 6 Supply 2 x EPWP branded overalls, 1 x pair of safety boots and 1 x EPWP branded hard hat to youth workers (ref. SL 11.03.01)

Item 72,000 00

PROVISION OF SMALL TOOLS FOR YOUTH WORKERS

- 7 Provide all youth workers with prescribed tools. (ref. SL 11.04.01)

Item 110,000 00

- 8 Profit and attendance on above (ref. SL 11.04.02)(10%)

Item

- 9 **Liaison with Service Provider (ref. SL 11.05) (N/A)**

Hrs

TRAVELLING DURING TRAINING

- 10 Travelling (based on R30.00 return trip per day per youth worker)

Item

- 11 Profit and attendance on above (ref. SL 11.06.02)(10%)

Item

MEDICAL TESTS

- 12 Medical fitness tests (ref. SL 11.07.01)

Item 35,000 00

- 13 Profit and attendance on above (ref. SL 11.07.02)(10%)

Item

Carried to Collection

R

Section: 6
Bill No. 1
EPWP - NYS
BTKM QUANTITY SURVEYORS

Section: 6

Bill No. 1

EPWP - NYS

COLLECTION

Total Brought Forward from Page No

**Page
No**

268

269

Amount

Carried to Final Summary

R

Section: 6

Bill No. 1

EPWP - NYS

BTKM QUANTITY SURVEYORS

CONTRACTOR PARTICIPATION GOALS

Item No	Quantity	Rate	Amount
<u>SECTION 7</u>			
<u>BILL NO. 1</u>			
<u>CONTRACT PARTICIPATION GOALS (CPG)</u>			
<u>PREAMBLES</u>			
Tenderers are advised to study the Additional Specification SL: Employment and Training of Labour on the Expanded Public Works Programme (EPWP) Infrastructure Projects: National Youth Service, as bound elsewhere in the Bills of Quantities, and then price this Bill accordingly.			
<u>Note to tenderers: As CPGs may not provide any bidder a competitive advantage. Provisional amounts and fixed percentages for profit and attendance have been provided. Only the provisional amount will be adjusted once the awarded tender amount and/or the beneficiaries have been appointed, and the final values have been ascertained</u>			
<u>MINIMUM TARGETED LOCAL BUILDING MATERIAL MANUFACTURERS</u>			
1	Allowance for monitoring and monthly reporting on material purchased from Local Building material suppliers by main contractor and subcontractors	%	
2	Allowance for profit all inclusive of associated costs to the contractor for implementation	%	
3	Allowance for attendance all inclusive of associated costs to the contractor for implementation	%	
4	Allowance for monitoring and monthly reporting on training provided by main contractor and subcontractors	%	
Carried to Collection			R
Section: 7			
Bill No. 1			
CONTRACTOR PARTICIPATION GOALS			
BTKM QUANTITY SURVEYORS			

**MINIMUM TARGETED LOCAL LABOUR
SKILLS DEVELOPMENT**

5 Allowance for monitoring and monthly reporting on training provided by main contractor and subcontractors

%

6 Allowance for profit all inclusive of associated costs to the contractor for implementation

%

7 Allowance for attendance all inclusive of associated costs to the contractor for implementation

%

**MINIMUM TARGETED LOCAL LABOUR
ENTERPRISE DEVELOPMENT**

8 Provision is made for 7% compulsory subcontracting to SMMEs in the execution of this project as described i PG-01.1 (EC) SCOPE OF WORKS C3.7.1 The percentage is the contractors allowance for the P & G's for the 7% subcontractors (SMME's). The PQS is to define the actual P & G items applicable to the SMME's e.g. scaffolding, PPE etc.

Item

9 A provisional amount has been allowed for in the execution of this project as described in PG-01.1 (EC)/PG-01.2 (EC) SCOPE OF WORKS C3.7.5. The provisional amount allowed is for the appointment of training coordinator, mentor, training service providers and training of the beneficiary enterprises including monitoring and monthly reporting.

Item

10 Allowance for monitoring and monthly reporting on SMME subcontracting by main contractor and subcontractors including training provided

Item

11 Allowance for profit all inclusive of associated costs to the contractor for implementation

Item

12 Allowance for attendance all inclusive of associated costs to the contractor for implementation

Item

Carried to Collection

R

Section: 7

Bill No. 1

CONTRACTOR PARTICIPATION GOALS

BTKM QUANTITY SURVEYORS

Section: 7

Bill No. 1

CONTRACTOR PARTICIPATION GOALS

COLLECTION

Total Brought Forward from Page No

Page
No

271

272

Amount

Carried to Final Summary

R

Section: 7

Bill No. 1

CONTRACTOR PARTICIPATION GOALS

BTKM QUANTITY SURVEYORS

FINAL SUMMARY

-274-

**T2.2 RETURNABLE DOCUMENTS
REQUIRED FOR
TENDER EVALUATION PURPOSES**

PA-11: BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

- 2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest (1) in the enterprise, employed by the state?

YES / NO

- 2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	Identity Number	Name of State institution

(1) the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.



2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution?

YES / NO

2.2.1 If so, furnish particulars:

.....
.....

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract?

YES / NO

2.3.1 If so, furnish particulars:

.....
.....

3 DECLARATION

I, the undersigned, (name).....
in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

- 3.1 I have read and I understand the contents of this disclosure;
- 3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;
- 3.3 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 consortium² will not be construed as collusive bidding.
- 3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.
- 3.5 The terms of the accompanying 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.
- 3.6 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

² 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.



- 3.7 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.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.

I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of bidder

This form has been aligned with SBD4

PA-15.1: RESOLUTION OF BOARD OF DIRECTORS

RESOLUTION of a meeting of the Board of *Directors / Members / Partners of:

(Legally correct full name and registration number, if applicable, of the Enterprise)

Held at _____ (place)

on _____ (date)

RESOLVED that:

- The Enterprise submits a Bid / Tender to the Department of Public Works in respect of the following project:

(Project description as per Bid / Tender Document)

Bid / Tender Number: _____ (Bid / Tender Number as per Bid / Tender Document)

- *Mr/Mrs/Ms: _____

in *his/her Capacity as: _____ (Position in the Enterprise)

and who will sign as follows: _____

be, and is hereby, authorised to sign the Bid / Tender, and any and all other documents and/or correspondence in connection with and relating to the Bid / Tender, as well as to sign any Contract, and any and all documentation, resulting from the award of the Bid / Tender to the Enterprise mentioned above.

	Name	Capacity	Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

PA-15.1: Resolution of Board of Directors

17			
18			
19			
20			

The bidding enterprise hereby absolves the Department of Public Works from any liability whatsoever that may arise as a result of this document being signed.

Note:

1. * Delete which is not applicable.
2. **NB:** This resolution must, where possible, be signed by all the Directors / Members / Partners of the Bidding Enterprise.
3. In the event that paragraph 2 cannot be complied with, the resolution must be signed by Directors / Members / Partners holding a majority of the shares / ownership of the Bidding Enterprise (attach proof of shareholding / ownership hereto).
4. Directors / Members / Partners of the Bidding Enterprise may alternatively appoint a person to sign this document on behalf of the Bidding Enterprise, which person must be so authorized by way of a duly completed power of attorney, signed by the Directors / Members / Partners holding a majority of the shares / ownership of the Bidding Enterprise (proof of shareholding / ownership and power of attorney are to be attached hereto).
5. Should the number of Directors / Members / Partners exceed the space available above, additional names and signatures must be supplied on a separate page.

ENTERPRISE STAMP

PA-15.2: RESOLUTION OF BOARD OF DIRECTORS TO ENTER INTO CONSORTIA OR JOINT VENTURES

RESOLUTION of a meeting of the Board of *Directors / Members / Partners of:

(Legally correct full name and registration number, if applicable, of the Enterprise)

Held at _____ (place)

on _____ (date)

RESOLVED that:

1. The Enterprise submits a Bid /Tender, in consortium/Joint Venture with the following Enterprises:

(List all the legally correct full names and registration numbers, if applicable, of the Enterprises forming the Consortium/Joint Venture)

to the Department of Public Works in respect of the following project:

(Project description as per Bid /Tender Document)

Bid / Tender Number: _____ (Bid / Tender Number as per Bid / Tender Document)

2. *Mr/Mrs/Ms: _____

in *his/her Capacity as: _____ (Position in the Enterprise)

and who will sign as follows: _____

be, and is hereby, authorised to sign a consortium/joint venture agreement with the parties listed under item 1 above, and any and all other documents and/or correspondence in connection with and relating to the consortium/joint venture, in respect of the project described under item 1 above.

3. The Enterprise accepts joint and several liability with the parties listed under item 1 above for the due fulfilment of the obligations of the joint venture deriving from, and in any way connected with, the Contract to be entered into with the Department in respect of the project described under item 1 above.
4. The Enterprise chooses as its *domicilium citandi et executandi* for all purposes arising from this joint venture agreement and the Contract with the Department in respect of the project under item 1 above:

Physical address: _____

_____ (code)

Postal Address: _____

 _____ (code)

Telephone number: _____

Fax number: _____

	Name	Capacity	Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

The bidding enterprise hereby absolves the Department of Public Works from any liability whatsoever that may arise as a result of this document being signed

Note:

- * Delete which is not applicable.
- NB:** This resolution must, where possible, be signed by all the Directors / Members / Partners of the Bidding Enterprise.
- In the event that paragraph 2 cannot be complied with, the resolution must be signed by Directors / Members / Partners holding a majority of the shares / ownership of the Bidding Enterprise (attach proof of shareholding / ownership hereto).
- Directors / Members / Partners of the Bidding Enterprise may alternatively appoint a person to sign this document on behalf of the Bidding Enterprise, which person must be so authorized by way of a duly completed power of attorney, signed by the Directors / Members / Partners holding a majority of the shares / ownership of the Bidding Enterprise (proof of shareholding / ownership and power of attorney are to be attached hereto).
- Should the number of Directors / Members / Partners exceed the space available above, additional names and signatures must be supplied on a separate page.

ENTERPRISE STAMP

PA-15.3: SPECIAL RESOLUTION OF CONSORTIA OR JOINT VENTURES

RESOLUTION of a meeting of the duly authorised representatives of the following legal entities who have entered into a consortium/joint venture to jointly bid for the project mentioned below: *(legally correct full names and registration numbers, if applicable, of the Enterprises forming a Consortium/Joint Venture)*

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

Held at _____ (place)

on _____ (date)

RESOLVED that:

RESOLVED that:

- A. The above-mentioned Enterprises submit a Bid in Consortium/Joint Venture to the Department of Public Works in respect of the following project:

(Project description as per Bid /Tender Document)

Bid / Tender Number: _____ *(Bid / Tender Number as per Bid /Tender Document)*

PA-15.3: Special Resolution of Consortia or Joint Ventures

B. *Mr/Mrs/Ms: _____

in *his/her Capacity as: _____ (Position in the Enterprise)

and who will sign as follows: _____

be, and is hereby, authorised to sign the Bid, and any and all other documents and/or correspondence in connection with and relating to the Bid, as well as to sign any Contract, and any and all documentation, resulting from the award of the Bid to the Enterprises in Consortium/Joint Venture mentioned above.

C. The Enterprises constituting the Consortium/Joint Venture, notwithstanding its composition, shall conduct all business under the name and style of:

D. The Enterprises to the Consortium/Joint Venture accept joint and several liability for the due fulfilment of the obligations of the Consortium/Joint Venture deriving from, and in any way connected with, the Contract entered into with the Department in respect of the project described under item A above.

E. Any of the Enterprises to the Consortium/Joint Venture intending to terminate the consortium/joint venture agreement, for whatever reason, shall give the Department 30 days written notice of such intention. Notwithstanding such decision to terminate, the Enterprises shall remain jointly and severally liable to the Department for the due fulfilment of the obligations of the Consortium/Joint Venture as mentioned under item D above.

F. No Enterprise to the Consortium/Joint Venture shall, without the prior written consent of the other Enterprises to the Consortium/Joint Venture and of the Department, cede any of its rights or assign any of its obligations under the consortium/joint venture agreement in relation to the Contract with the Department referred to herein.

G. The Enterprises choose as the *domicilium citandi et executandi* of the Consortium/Joint Venture for all purposes arising from the consortium/joint venture agreement and the Contract with the Department in respect of the project under item A above:

Physical address: _____

_____ (Postal code) _____

Postal Address: _____

_____ (Postal code) _____

Telephone number: _____

Fax number: _____

PA-15.3: Special Resolution of Consortia or Joint Ventures

	Name	Capacity	Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

The bidding enterprise hereby absolves the Department of Public Works & Infrastructure from any liability whatsoever that may arise as a result of this document being signed.

Note:

- * Delete which is not applicable.
- NB:** This resolution must be signed by all the Duly Authorised Representatives of the Legal Entities to the consortium/joint venture submitting this tender, as named in item 2 of Resolution PA-15.2.
- Should the number of the Duly Authorised Representatives of the Legal Entities joining forces in this tender exceed the space available above, additional names, capacity and signatures must be supplied on a separate page.
- Resolution PA-15.2, duly completed and signed, from the separate Enterprises who participate in this consortium/joint venture, must be attached to this Special Resolution (PA-15.3).

DPW-16 (EC): SITE INSPECTION MEETING CERTIFICATE

Project title:	WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE		
Tender / Quotation no:	<i>BL25/015</i>	Reference no:	<i>14/2/1/4/12/6835/1</i>
Closing date:	<i>30 SEPTEMBER 2025</i>		

This is to certify that I, _____ representing

_____ in the capacity of

_____ visited the site on:

15 SEPTEMBER 2025

I have made myself familiar with all local conditions likely to influence the work and the cost thereof. I further certify that I am satisfied with the description of the work and explanations given at the site inspection meeting and that I understand perfectly the work to be done, as specified and implied, in the execution of this contract.

Name of Tenderer	Signature	Date

Name of DPW Representative	Signature	Date



PA-16: PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 **Preference Points System to be applied**

(tick whichever is applicable).

- ☐ The applicable preference point system for this tender is the **80/20** preference point system.
- ☒ The applicable preference point system for this tender is the **90/10** preference point system.
- ☐ Either the **90/10** or **80/20** preference point system will be applicable in this tender. The lowest/ highest acceptable tender will be used to determine the accurate system once tenders are received.

1.3 **Points for this tender shall be awarded for:**

1.3.1 **Price; and**

1.3.2 **Specific Goals**

1.4 **The maximum points for this tender are allocated as follows:**

CHOOSE APPLICABLE PREFERENCE POINT SCORING SYSTEM	<input type="checkbox"/> 80/20	<input checked="" type="checkbox"/> 90/10
PRICE	80	90
SPECIFIC GOALS	20	10
Total points for Price and Specific Goals	100	100

1.5 Breakdown Allocation of Specific Goals Points

- ☐ **1.5.1. For procurement transaction with rand value greater than R2 000, 00 and up to R1 Million (Inclusive of all applicable taxes) the specific goals listed in table 1 below are applicable.**

Table 1

Serial No	Specific Goals	Preference Points Allocated out of 20	Documentation to be submitted by bidders to validate their claim
1.	An EME or QSE which is at least 51% owned by black people (Mandatory)	10	<ul style="list-style-type: none"> SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.
2.	Located in a specific Local Municipality or District Municipality or Metro or Province area for work to be done or services to be rendered in that area (Mandatory)	2	<ul style="list-style-type: none"> Official Municipal Rates Statement which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none"> Any account or statement which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none"> Permission to Occupy from local chief in case of rural areas (PTO) which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none"> Lease Agreement which is in the name of the bidder.
3.	An EME or QSE which is at least 51% owned by black women (Mandatory)	4	<ul style="list-style-type: none"> SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.
4.	An EME or QSE which is at least 51% owned by black people with disability (Mandatory)	2	<ul style="list-style-type: none"> SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.

			<p>and</p> <ul style="list-style-type: none"> • Medical Certificate indicating that the disability is permanent. <p>Or</p> <ul style="list-style-type: none"> • South African Social Security Agency (SASSA) Registration indicating that the disability is permanent. <p>Or</p> <ul style="list-style-type: none"> • National Council for Persons with Physical Disability in South Africa registration (NCPDPSA).
5.	An EME or QSE which is at least 51% owned by black youth (Mandatory)	2	<ul style="list-style-type: none"> • ID Copy and SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.



1.5.2. For procurement transaction with rand value greater than R1 Million and up to R50 Million (Inclusive of all applicable taxes) the specific goals listed in table 2 below are applicable.

Table 2

Serial No	Specific Goals	Preference Points Allocated out of 20	Documentation to be submitted by bidders to validate their claim
1.	An EME or QSE or any entity which is at least 51% owned by black people (Mandatory)	10	<ul style="list-style-type: none"> • SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.
2.	Located in a specific Local Municipality or District Municipality or Metro or Province area for work to be done or services to be rendered in that area (Mandatory)	2	<ul style="list-style-type: none"> • Official Municipal Rates Statement which is in the name of the bidder. <p>Or</p>

			<ul style="list-style-type: none"> Any account or statement which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none"> Permission to Occupy from local chief in case of rural areas (PTO) which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none"> Lease Agreement which is in the name of the bidder.
3.	An EME or QSE or any entity which is at least 51% owned by black women (Mandatory)	4	<ul style="list-style-type: none"> SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.
4.	An EME or QSE or any entity which is at least 51% owned by black people with disability (Mandatory)	2	<ul style="list-style-type: none"> SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable. <p>and</p> <ul style="list-style-type: none"> Medical Certificate indicating that the disability is permanent. <p>Or</p> <ul style="list-style-type: none"> South African Social Security Agency (SASSA) Registration indicating that the disability is permanent. <p>Or</p> <p>National Council for Persons with Physical Disability in South Africa registration (NCPDSA).</p>

5.	An EME or QSE or any entity which is at least 51% owned by black youth (Mandatory)	2	<ul style="list-style-type: none">ID Copy and SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.
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1.5.3. For procurement transaction with rand value greater than R50 Million (Inclusive of all applicable taxes) the specific goals listed in table 3 below are applicable.

NB. The use of one of goal numbers' 4 or 5 is mandatory. The BSC must select either one of the two, but not both.

Table 3

Serial No	Specific Goals	Preference Points Allocated out of 10	Documentation to be submitted by bidders to validate their claim
1.	An EME or QSE or any entity which is at least 51% owned by black people (Mandatory)	4	<ul style="list-style-type: none">SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.
2.	Located in a specific Local Municipality or District Municipality or Metro or Province area for work to be done or services to be rendered in that area (Mandatory)	2	<ul style="list-style-type: none">Official Municipal Rates Statement which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none">Any account or statement which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none">Permission to Occupy from local chief in case of rural areas (PTO) which is in the name of the bidder. <p>Or</p> <ul style="list-style-type: none">Lease Agreement which is in the name of the bidder.
3.	An EME or QSE or any entity which is at least 51%	2	<ul style="list-style-type: none">SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable.

		owned by black women (mandatory)		
4. <input type="checkbox"/>		An EME or QSE or any entity which is at least 51% owned by black people with disability (Mandatory)	2	<ul style="list-style-type: none"> • SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable. <p>and</p> <ul style="list-style-type: none"> • Medical Certificate indicating that the disability is permanent. <p>Or</p> <ul style="list-style-type: none"> • South African Social Security Agency (SASSA) Registration indicating that the disability is permanent. <p>Or</p> <p>National Council for Persons with Physical Disability in South Africa registration (NCPDPSA).</p>
OR				
5. <input type="checkbox"/>		An EME or QSE or any entity which is at least 51% owned by black youth (Mandatory)	2	<ul style="list-style-type: none"> • ID Copy and SANAS Accredited BBBEE Certificate or Sworn Affidavit where applicable

Black people mean Africans, Coloureds and Indians, who - (a) are citizens of the Republic of South Africa by birth or descent; or (b) became citizens of the Republic of South Africa by naturalisation - (i) before 27 April 1994; or (ii) on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalisation prior to that date. (BROAD-BASED BLACK ECONOMIC EMPOWERMENT ACT No 25899, 2003 of 9 JANUARY 2004).

- 1.6 Failure on the part of the tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals, if the service provider/ tenderer did not submit proof or documentation required to claim for specific goals will be interpreted to mean that preference points for specific goals are not claimed.
- 1.7 The organ of state reserves the right to require of a service provider/tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2. DEFINITIONS

- (a) **“tender”** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations,

competitive tendering process or any other method envisaged in legislation;

- (b) “**price**” means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- (c) “**rand value**” means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- (d) “**tender for income-generating contracts**” means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- (e) “**the Act**” means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

3.1.1. THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

$$\begin{array}{ccc} 80/20 & \text{or} & 90/10 \\ Ps = 80 \left(1 - \frac{Pt - P_{min}}{P_{min}} \right) & \text{or} & Ps = 90 \left(1 - \frac{Pt - P_{min}}{P_{min}} \right) \end{array}$$

Where

- Ps = Points scored for price of tender under consideration
- Pt = Price of tender under consideration
- Pmin = Price of lowest acceptable tender

3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

$$\begin{array}{ccc} 80/20 & \text{or} & 90/10 \\ Ps = 80 \left(1 + \frac{Pt - P_{max}}{P_{max}} \right) & \text{or} & Ps = 90 \left(1 + \frac{Pt - P_{max}}{P_{max}} \right) \end{array}$$

Where

- Ps = Points scored for price of tender under consideration
- Pt = Price of tender under consideration
- Pmax = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

- 4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1,2 and 3 above as may be supported by proof/ documentation stated in the conditions of this tender:
- 4.2. In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—
- (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or
 - (b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,
- then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 4: Specific goals for the tender and points claimed are indicated per the table below.

(Note to organs of state: Where either the 90/10 or 80/20 preference point system is applicable, corresponding points must also be indicated as such.

Note to tenderers: The tenderer must indicate how they claim points for each preference point system.)

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)	Number of points claimed (80/20 system) (To be completed by the tenderer)
1. An EME or QSE (or any entity for procurement transaction with rand value greater than R1 Million) which is at least 51% owned by black people	4	10		
2. Located in a specific Local Municipality or District Municipality or Metro or	2	2		

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)	Number of points allocated (80/20 system)	Number of points claimed (90/10 system)	Number of points claimed (80/20 system)
	(To be completed by the organ of state)	(To be completed by the organ of state)	(To be completed by the tenderer)	(To be completed by the tenderer)
Province area for work to be done or services to be rendered in that area				
3. An EME or QSE (or any entity for procurement transaction with rand value greater than R1 Million) which is at least 51% owned by black women	2	4		
4. An EME or QSE (or any entity for procurement transaction with rand value greater than R1 Million) which is at least 51% owned by black people with disability	2	2		
5. An EME or QSE (or any entity for procurement transaction with rand value greater than R1 Million) which is at least 51% owned by black youth.*	2	2		

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm.....

4.4. Company registration number:

4.5. TYPE OF COMPANY/ FIRM

Partnership/Joint Venture / Consortium
One-person business/sole propriety
Close corporation
Public Company
Personal Liability Company
(Pty) Limited
Non-Profit Company

- 4.6. I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I 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 in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
 - iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –
 - (a) disqualify the person from the tendering process;
 - (b) recover costs, losses or damages it has incurred or suffered as a result of that person'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) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
 - (e) forward the matter for criminal prosecution, if deemed necessary.

.....	
SIGNATURE(S) OF TENDERER(S)	
SURNAME AND NAME:
DATE:
ADDRESS:

DPW-09 (EC): PARTICULARS OF TENDERER'S PROJECTS

Project title:	WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE		
Tender / quotation no:	BL25/015	Closing date:	30 SEPTEMBER 2025
Advertising date:	2025/09/05	Validity period:	84 CALENDAR DAYS

1. PARTICULARS OF THE TENDERER'S CURRENT AND PREVIOUS COMMITMENTS

1.1. Current projects

Projects currently engaged in	Name of Employer or Representative of Employer	Contact tel. no.	Contract sum	Contractual commencement date	Contractual completion date	Current percentage progress
1						
2						
3						
4						
5						
6						
7						
8						

1.2. Completed projects

Projects completed in the previous 5 (five) years	Name of Employer or Representative of Employer	Contact tel. no.	Contract sum	Contractual commencement date	Contractual completion date	Date of Certificate of Practical Completion
1						
2						
3						
4						
5						
6						
7						
8						
9						

Name of Tenderer	Signature	Date

**T2.2: RETURNABLE DOCUMENTS THAT WILL BE
INCORPORATED INTO THE CONTRACT**

PA- 40: DECLARATION OF DESIGNATED GROUPS

Tender no: **BL25/015**

Name of Tenderer

☐ EME¹ ☐ QSE² ☐ Non EME/QSE (tick applicable box)

1. LIST ALL PROPRIETORS, MEMBERS OR SHAREHOLDERS BY NAME, IDENTITY NUMBER, CITIZENSHIP AND DESIGNATED GROUPS.

Name and Surname #	Identity/ Passport number and Citizenship##	Percentage owned	Black	Indicate if youth	Indicate if woman	Indicate if person with disability	Indicate if living in Rural (R) / Under Developed Area (UD) / Township (T) / Urban (U).	Indicate if military veteran
1.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
5.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
7.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
8.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
9.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
10.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
11.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No
12.		%	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> R <input type="checkbox"/> UD <input type="checkbox"/> T <input type="checkbox"/> U	<input type="checkbox"/> Yes <input type="checkbox"/> No

Where Owners are themselves a Company, Close Corporation, Partnership etc, identify the ownership of the Holding Company, together with Registration number
State date of South African citizenship obtained (not applicable to persons born in South Africa)

¹ EME: Exempted Micro Enterprise

² QSE: Qualifying Small Business Enterprise

PA- 40: DECLARATION OF DESIGNATED GROUPS

Tender no:

2. DECLARATION:

The undersigned, who warrants that he/she is duly authorized to do so on behalf of the Tenderer, hereby confirms that:

- 1 The information and particulars contained in this Affidavit are true and correct in all respects;
- 2 The Broad-based Black Economic Empowerment Act, 2003 (Act 53 of 2003), Preferential Procurement Policy Framework Act, 2000 (Act 5 of 2000), National Small Business Act 102 of 1996 as amended and all documents pertaining to this Tender were studied and understood and that the above form was completed according to the definitions and information contained in said documents;
- 3 The Tenderer understands that any intentional misrepresentation or fraudulent information provided herein shall disqualify the Tenderer's offer herein, as well as any other tender offer(s) of the Tenderer simultaneously being evaluated, or will entitle the Employer to cancel any Contract resulting from the Tenderer's offer herein;
- 4 The Tenderer accepts that the Employer may exercise any other remedy it may have in law and in the Contract, including a claim for damages for having to accept a less favourable tender as a result of any such disqualification due to misrepresentation or fraudulent information provided herein;
- 5 Any further documentary proof required by the Employer regarding the information provided herein, will be submitted to the Employer within the time period as may be set by the latter;

Signed by the Tenderer

Name of representative	Signature	Date

DPW-21 (EC): RECORD OF ADDENDA TO TENDER DOCUMENTS

Project title:	WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE		
Tender no:	BL25/015	Reference no:	14/2/1/4/12/6835/1

1. I / We confirm that the following communications received from the Department of Public Works and Infrastructure before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer: *(Attach additional pages if more space is required)*

	Date	Title or Details
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		

Name of Tenderer	Signature	Date

2. I / We confirm that no communications were received from the Department of Public Works and Infrastructure before the submission of this tender offer, amending the tender documents.

--	--	--



public works
& infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

DPW-21 (EC): Record of addenda to tender

documents

Name of Tenderer	Signature	Date
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DPW-15 (EC): SCHEDULE OF PROPOSED SUBCONTRACTORS

Project title:	<i>WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE</i>		
Tender no:	<i>BL25/015</i>	Reference no:	<i>14/2/1/412/6835/1</i>

We notify you that it is our intention to employ the following Subcontractors for work in this contract.

We confirm that all subcontractors who are contracted to construct a house are registered as home builders with the National Home Builders Registration Council.

	Name and address of proposed Subcontractor	Nature and extent of work	Previous experience with Subcontractor
1			
2			
3			
4			
5			

Name of representative	Signature	Capacity	Date

Name of organisation:	
------------------------------	--



DPW-22 (EC): PARTICULARS OF ELECTRICAL CONTRACTOR

Project title:	WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE		
Tender no:	BL25/015	Reference no:	14/2/1/4/12/6835/1

Name of Electrical Contractor:	
Address:	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Electrical Contractor registration number at the Department of Labour	<hr/>

Name of Tenderer	Signature	Date

**MECHANICAL/ ELECTRICAL/ SECURITY
WORK MATERIAL AND EQUIPMENT
SCHEDULES**

DPW-23 (EC): SCHEDULE FOR IMPORTED MATERIALS AND EQUIPMENT

Project title:	WELKOM: THABONG FOR THE INSTALLATION AND CONNECTION TO BACKUP GENERATOR, PROVISION OF EMERGENCY WATER STORAGE, FIRE ESCAPES AND COMPLETE REPAIR OF ROOF STRUCTURE AT THE SAPS COLLEGE		
Tender no:	BL25/015	Reference no:	14/2/1/4/12/6835/1

This schedule should be completed by the tenderer. (Attach additional pages if more space is required)

Item	Material / Equipment	Rand (R) (Excluding VAT)
1.		R
2.		R
3.		R
4.		R
5.		R
6.		R

Provide additional list if space provided is insufficient.

The Contractor shall list imported items, materials and/or equipment which shall be excluded from the Contract Price Adjustment Provisions (if applicable) and shall be adjusted in terms of currency fluctuations only. Copies of the supplier's quotations for the items, materials or equipment (provided that such costs shall not be higher than the relevant contract rate as listed above) should be lodged with the Principal Agent / Engineer of the Department of Public Works and Infrastructure within 60 (sixty) days from the date of acceptance of the tender. No adjustment of the local VAT amount, nor the contractor's profit, discount, mark-up, handling costs, etc. shall be allowed.

These net amounts will be adjusted as follows:

FORMULA:

The net amount to be added to or deducted from the contract sum:

$$A = V \left(\frac{Z}{Y} - 1 \right)$$

A = the amount (R) of adjustment

V = the net amount (supplier's quotation) (R) of the imported item

Y = exchange rate at the closing date of tender submission

Z = exchange rate on the date of payment.

Name of Tenderer	Signature	Date

**ELECTRICAL AND MECHANICAL
SPECIFICATIONS**

ELECTRICAL SPECIFICATIONS



**REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF PUBLIC WORKS**

ELECTRICAL INSTALLATION

FOR THE PROJECT:

**WELKOM THABONG SAPS: TRAINING COLLEGE:
INSTALLATION AND CONNECTION TO A BACKUP
GENERATOR, PROVISION OF EMERGENCY WATER
STORAGE, FIRE ESCAPE AND COMPLETE REPAIR TO ROOF
STRUCTURE**

PART B

CONSISTING OF:

**PART A
SECTION 1 to 3: BUILDING WORK
(See separate document)**

**PART B
ELECTRICAL INSTALLATION**

**PART C
RETURNABLE SCHEDULES
(See separate document)**

SEPTEMBER 2025

**SPECIFICATION FOR THE ELECTRICAL INSTALLATION
OF A COMPREHENSIVE SERVICE**

AT

THABONG – WELKOM: FREE STATE

CONSISTING OF:

SECTION C3..... : ELECTRICAL INSTALLATION WORK

In part C3 see separate documents for:

Building work
Mechanical work
Fire detection work
Generator
Lift
Etc.

INDEX**PAGE NO.**

SPECIFICATION FOR ELECTRICAL WORK	
PART 1 - GENERAL	
PART 2: INSTALLATION DETAILS	
7a. SHAVER SOCKETS	
PART 4: BILLS OF QUANTITIES	
PART 5: ELECTRICAL WORK MATERIAL SCHEDULE	
PARTICULARS OF ELECTRICAL CONTRACTOR	
PART 6: DRAWINGS	

SPECIFICATION FOR ELECTRICAL WORK

PART 1 - GENERAL

CONTENTS

1	TESTS.....
2	MAINTENANCE OF INSTALLATIONS.....
3	REGULATIONS
4	NOTICES AND FEES
5	SCHEDULE OF FITTINGS
6	QUALITY OF MATERIALS
7	CONDUIT AND ACCESSORIES
8	CONDUIT IN ROOF SPACES
9	SURFACE MOUNTED CONDUIT
10	CONDUIT IN CONCRETE SLABS.....
11	FLEXIBLE CONNECTIONS FOR CONNECTING UP OF STOVES, MACHINES, ETC.
12	WIRING:.....
13	SWITCHES AND SOCKET OUTLETS.....
14	SWITCHGEAR
16	WORKMANSHIP AND STAFF
17	CERTIFICATE OF COMPLIANCE
18	EARTHING OF INSTALLATION
19	MOUNTING AND POSITIONING OF LUMINAIRES.....

PART 1 - GENERAL

1 TESTS

After completion of the works and before practical completion is achieved, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installations will be inspected, and the Contractor shall make good, to the satisfaction of the Principle Agent/Electrical Engineer or the employer, any defects which may arise.

The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installations at completion.

2 MAINTENANCE OF INSTALLATIONS

With effect from the date of the Practical completion Certificate the Contractor shall at his own expense undertake the regular servicing of the installation during the maintenance period and shall make all adjustments necessary for the correct operation thereof.

If during the said period the installations is not in working order for any reason for which the Contractor is responsible, or if the installations develop defects, he shall immediately upon being notified thereof take steps to remedy the defects and make any necessary adjustments.

Should such stoppages however be so frequent as to become troublesome, or should the installations otherwise prove unsatisfactory during the said period the Contractor shall, if called upon by the Principal Agent / Electrical Engineer or the Employer, at his own expense replace the whole of the installations or such parts thereof as the Principal Agent / Electrical Engineer or the Employer may deem necessary with apparatus specified by the Principal Agent / Electrical Engineer or the Employer.

3 REGULATIONS

The installation shall be erected and tested in accordance with the Acts and Regulations as indicated in the scope of works

4 NOTICES AND FEES

The Contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be due to the local Supply Authority.

On production of the official account, only the net amount of the fee charged by the Supply Authority for connection of the installation to the supply mains, will be refunded to the Contractor by the Employer.

5 SCHEDULE OF FITTINGS

In all instances where schedule of light, socket outlet and power points are attached to or included on the drawings, these schedules are to be regarded as forming part of the specification.

6 QUALITY OF MATERIALS

Only materials of first-class quality shall be used and all materials shall be subject to the approval of the Employer. Departmental specifications for various materials to be used on this Contract are attached to and form part of this specification.

Wherever applicable the material is to comply with the relevant South African Bureau of Standards, specifications, or to IEC Specifications, where no SANS Specifications exist.

Materials wherever possible, must be of South African manufacture.

7 CONDUIT AND ACCESSORIES

The type of conduit and accessories required for the service, i.e. whether the conduit and accessories shall be of the screwed type, plain-end type or of the non-metallic type and whether metallic conduit shall be black enamelled or galvanised, is specified in Part 2 of this specification.

Unless other methods of installation are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in roof spaces or elsewhere will be permitted.

The conduit and conduit accessories shall comply fully with the applicable SANS specifications as set out below and the conduit shall bear the mark of approval of the South African Bureau of Standards.

a) Screwed metallic conduit and accessories: SANS 61386-1 and 21.

b) Plain-end metallic conduit and accessories: SANS 61386-1 and 21.

c) Non-metallic conduit and accessories: SANS 61386-1 and 21.

All conduit fittings except couplings, shall be of the inspection type. Where cast metal conduit accessories are used, these shall be of malleable iron. Zinc base fittings will not be allowed.

Bushes used for metallic conduit shall be brass and shall be provided in addition to locknuts at all points where the conduit terminates at switchboards, switchboxes, draw-boxes, etc.

Draw-boxes are to be provided in accordance with the "Wiring Code" and wherever necessary to facilitate easy wiring.

For light and socket outlet circuits, the conduit used shall have an external diameter of 20 mm. In all other instances the sizes of conduit shall be in accordance with the "Wiring Code" for the specified number and size of conductors, unless otherwise directed in part 2 of this specification or indicated on the drawings.

Only one manufactured type of conduit and conduit accessories will be permitted throughout the installation.

Running joints in screwed conduit are to be avoided as far as possible and all conduit systems shall be set or bent to the required angles. The use of normal bends must be kept to a minimum with exception of larger diameter conduits where the use of such bends is essential.

All metallic conduits shall be manufactured of mild steel with a minimum thickness of 1,2 mm for plain-end conduit and 1,6 mm in respect of screwed conduit.

Under no circumstances will conduit having a wall thickness of less than 1,6 mm be allowed in screed laid on top of concrete slabs.

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

Conduit and conduit accessories used for flame-proof or explosion proof installations and for the suspension of luminaires as well as all load bearing conduit shall in all instances be of the metallic screwed type.

All conduit and accessories used in areas within 50 km of the coast shall be galvanised to SANS 32 and SANS 121.

Tenderers must ensure that general approval of the proposed conduit system to be used is obtained from the local electricity supply authority prior to the submission of their tender. Under no circumstances will consideration be given by the Department to any claim submitted by the Contractor, which may result from a lack of knowledge in regard to the supply authority's requirements.

8 CONDUITS IN ROOF SPACES

Conduit in roof spaces shall be installed parallel or at right angles to the roof members and shall be secured at intervals not exceeding 1,5 m by means of saddles screwed to the roof timbers.

Nail or crampets will not be allowed.

Where non-metallic conduit has been specified for a particular service, the conduit shall be supported and fixed with saddles with a maximum spacing of 450 mm. The Contractor shall supply and install all additional supporting timbers in the roof space as required.

Under flat roofs, in false ceilings or where there is less than 0,9 m of clearance, or should the ceilings be insulated with glass wool or other insulating material, the conduit shall be installed in such a manner as to allow for all wiring to be executed from below the ceilings.

Conduit runs from distribution boards shall, where possible terminate in fabricated sheet steel draw-boxes installed directly above or in close proximity to the boards.

9 SURFACE MOUNTED CONDUIT

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified under Part 2 of the specification, conduit installed on the surface must be plumbed or levelled and only straight lengths shall be used.

The use of inspection bends is to be avoided and instead the conduit shall be set uniformly and inspection coupling used where necessary.

No threads will be permitted to show when the conduit installation is complete, except where running couplings have been employed.

Running couplings are only to be used where unavoidable and shall be fitted with a sliced couplings as a lock nut.

Conduit is to be run on approved spaced saddles rigidly secured to the walls.

Alternatively, fittings, tees, boxes, couplings etc., are to be cut into the surface to allow the conduit to fit flush against the surface. Conduit is to be bedded into any wall irregularities to avoid gaps between the surface and the conduit.

Crossing of conduits is to be avoided, however, should it be necessary purpose-made metal boxes are to be provided at the junction. The finish of the boxes and positioning shall be in keeping with the general layout.

Where several conduits are installed side by side, they shall be evenly spaced and grouped under one purpose-made saddle.

Distribution boards, draw-boxes, industrial switches and socket outlets etc., shall be neatly recessed into the surface to avoid double sets.

In situations where there are no ceilings the conduits are to be run along the wall plates and the beams.

Painting of surface conduit shall match the colour of the adjacent wall finishes.

Only approved plugging materials such as aluminium inserts, fibre plugs, plastic plugs, etc., and round-head screws shall be used for fixing saddles, switches, socket outlets, etc., to walls, wood plugs and the plugging in joints in brick walls are not acceptable.

10 CONDUITS IN CONCRETE SLABS

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 in attendance at all times when the casting of concrete takes place.

Draw-boxes, expansion joint boxes and round conduit boxes are to be provided where necessary. Sharp bends of any nature will not be allowed in concrete slabs.

Draw and/or inspection boxes shall be grouped under one common cover plate and must preferable be installed in passages or male toilets.

All boxes, etc., are to be securely fixed to the shuttering to prevent displacement when concrete is cast. The conduit shall be supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete slabs and/or beams.

Before any concrete slabs are cast, all conduit droppers to switchboards shall be neatly spaced and rigidly fixed.

11 FLEXIBLE CONNECTIONS FOR CONNECTING UP OF STOVES, MACHINES, ETC.

Flexible tubing connections shall be of galvanised steel construction, and in damp situations of the plastic sheathed galvanised steel type. Other types may only be used subject to the prior approval of the Department's site electrical representative.

Connectors for coupling onto the flexible tubing shall be of the gland or screw-in types, manufactured of either brass or cadmium or zinc plated mild steel, and the connectors after having been fixed onto the tubing, shall be durable and mechanically sound.

Aluminium and zinc alloy connectors will not be acceptable.

12 WIRING:

Except where otherwise specified in Part 2 of this specification, wiring shall be carried out in conduit throughout. Only one circuit per conduit will be permitted.

No wiring shall be drawn into conduit until the conduit installation has been completed, and all conduit ends provided with bushes. All conduits to be clear of moisture and debris before wiring is commenced.

Unless otherwise specified in Part 2 of this specification or indicated on the service drawings, the wiring of the installation 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-end 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 luminaires and switches throughout the installation.

Wiring for lighting circuits is to be carried out with 2,5 mm² conductors and a 1,5 mm² earth conductor. For socket outlet circuits the wiring shall comprise 4 mm² conductors and a 2,5 mm² earth conductor. In certain instances, as will be directed in Part 2 of this specification, the sizes of the afore mentioned conductors may be increased for specified circuits. Sizes of conductors to be drawn into conduit in all other instances, such as feeders to distribution boards, power points etc., shall be as specified elsewhere in this specification or indicated on the drawings. Sizes of conductors not specified must be determined in accordance with the "Wiring Code".

The loop-in system shall be followed throughout, and no joints of any description will be permitted.

The wiring shall be done in PVC insulated 600 / 1000 V grade cable to SANS 1507.

Where cable ends connect onto switches, luminaires etc., the end strands must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any cable will not be allowed.

13 SWITCHES AND SOCKET OUTLETS

All switches and switch-socket outlet combination units shall conform to the Departmental Quality Specifications, which form part of this specification.

No other than 16 A 3 pin sockets are to be used, unless other special purpose types are distinctly specified or shown on the drawings.

All light switches shall be installed at 1,4 m above finished floor level and all socket outlets as directed in the Schedule of Fittings which forms part of this specification or alternatively the height of socket outlets may be indicated on the drawings.

14 SWITCHGEARS

Switchgear, which includes circuit breakers, iron-clad switches, interlocked switch-socket outlet units, contactors, time switches, etc., is to be in accordance with the Departmental Quality Specifications which form part of this specification and shall be equal and similar in quality to such brands as may be specified.

For uniform appearance of switchboards, only one approved make of each of the different classes of switchgear mentioned in the Quality Specifications shall be used throughout the installations.

15 SWITCHBOARDS

All boards shall be in accordance with the types as specified, be constructed according to the detail or type drawings and must be approved by the Employer before installation.

In all instances where provision is to be made on boards for the supply authority's main switch and/or metering equipment the contractor must ensure that all requirements of the authorities concerned in this respect are met.

Any construction or standard type aboard proposed, as an alternative to that specified must have the prior approval of the Employer.

All busbars, wiring, terminals, etc., are to be adequately insulated and all wiring is to enter the switchgear from the back of the board. The switchgear shall be mounted within the boards to give a flush front panel. Cable and boxes and other ancillary equipment must be provided where required.

Clearly engraved labels are to be mounted on or below every switch. The working of the labels in English, is to be according to the lay-out drawings or as directed by the Electrical Engineer and must be confirmed on site. Flush mounted boards to be installed with the top of the board 2,0 m above the finished floor level.

16 WORKMANSHIP AND STAFF

Except in the case of electrical installations supplied by a single-phase electricity supply at the point of supply, an accredited person shall exercise general control over all electrical installation work being carried out.

The workmanship shall be of the highest grade and to the satisfaction of the Employer.

All inferior work shall, on indication by the Employer's inspecting officers, immediately be removed and rectified by and at the expense of the Contractor.

17 VERIFICATION AND CERTIFICATION OF ELECTRICAL INSTALLATION (CERTIFICATE OF COMPLIANCE AND TEST REPORT)

On completion of the service, a certificate of compliance must be issued to the Principal Agent / Electrical Engineer or Employer in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) in the format as set out in SANS 10142-1 & 2.

18 EARTHING OF INSTALLATION

Main earthing

The type of main earthing must be as required by the supply authority if other than the Employer, and in any event as directed by the Principal Agent / Electrical Engineer, who may require additional earthing to meet test standards.

Where required an earth mat shall be provided, the minimum size, unless otherwise specified, being 1,0 m x 1,0 m and consisting of 4 mm diameter hard-drawn bare copper wires at 250 mm centres, brazed at all intersections.

Alternatively: or additional earth rods or trench earths may be required as specified or directed by the Electrical Engineer.

Installations shall be effectively earthed in accordance with the "Wiring Code" and to the requirements of the supply authority. All earth conductors shall be stranded copper with or without green PVC installation.

Connection from the main earth bar on the main board must be made to the cold water main, the incoming service earth conductor, if any and the earth mat or other local electrode by means of 12 mm x 1,60 mm solid copper strapping or 16 mm² stranded (not solid) bare copper wire or such conductor as the Department's representative may direct. Main earth copper strapping where installed below 3 m from ground level, must be run in 20 mm diameter conduit securely fixed to the walls.

All other hot- and cold- water pipes shall be connected with 12 mm x 0,8 mm perforated for 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 150 mm centres. In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,6 m 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.

Roofs, gutters and down pipes

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed. One bare 10 mm² copper conductor shall be installed over the full length of the ceiling void, fixed to the top purlin and connected to the main earth conductor and each switchboard. The roof and gutters shall be connected at 15 m intervals to this conductor by means of 12 mm x 0,8 mm copper strapping (not conductors) and galvanised bolts and nuts. Self-tapping screws are not acceptable. Where service connections consist of underground supplies, the above requirements are not applicable.

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 a bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively, armoured cables with earth continuity conductors included in the armouring may be utilised where specified or approved.

Sub-circuits

The earth conductors of all sub-circuits shall be connected to the earth busbar in the supply board in accordance with SANS 10142.

Ring Mains

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, 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.

Non-metallic Conduit

Where non-metallic conduit is specified or allowed, the installation shall comply with the Department's standard quality specification for "conduit and conduit accessories".

Standard 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, draw-boxes, switchboards, luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

Flexible Conduit

An earth conductor shall be installed in all non-metal flexible conduit. 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.

Connection

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilised 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.

19 MOUNTING AND POSITIONING OF LUMINAIRES

The Contractor is to note that in the case of board and acoustic tile ceilings, i.e. as opposed to concrete slabs, close co-operation with the building contractor is necessary to ensure that as far as possible the luminaires are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaires as indicated on the drawings must be adhered to as far as possible and must be confirmed with the Department's representative.

Fluorescent luminaires installed against concrete ceilings shall be screwed to the outlet boxes and in addition 2 x 6 mm expansion or other approved type fixing bolts are to be provided. The bolts are to be $\frac{3}{4}$ of the length of the luminaires apart.

Fluorescent luminaires to be mounted on board ceilings shall be secured by means of two 40 mm x No. 10 round head screws and washers. The luminaires shall also be bonded to the circuit conduit by means of locknuts and brass bushes. The fixing screws are to be placed $\frac{3}{4}$ of the length of the fitting apart.

Earth conductors must be drawn in with the circuit wiring and connected to the earthing terminal of all fluorescent luminaires as well as other luminaires exposed to the weather in accordance with the "Wiring Code".

Incandescent luminaires are to be screwed directly to outlet boxes in concrete slabs. Against board ceilings the luminaires shall be secured to the bracing or joists by means of two 40 mm x No. 8 round head screws.

PART 2: INSTALLATION DETAILS

CONTENTS

1	CABLE SLEEVE PIPES
2	NOTICES
3	ELECTRICAL EQUIPMENT
4	DRAWINGS
5	BALANCING OF LOAD
6	SERVICE CONDITIONS
7	SWITCHES AND SOCKET OUTLETS
8	LIGHT FITTINGS AND LAMPS
9	EARTHING AND BONDING
10	MAINTENANCE OF ELECTRICAL SUPPLY
11	EXTENT OF WORK
12	SUPPLY AND CONNECTION
13	CONDUIT AND WIRING
14	POWER POINTS
15	CABLES
16	DISTRIBUTION BOARDS
17	SUBSTATION
18	SCHEDULE OF LIGHT FITINGS
19	SCHEDULE OF POWER POINTS
20	SCHEDULE OF CABLES, CONDUIT AND WIRING
21	SCHEDULE OF DISTRIBUTION BOARDS
22	SUMMARY OF SWITCHGEAR AND CIRCUITS

PART 2: INSTALLATION DETAILS

1 CABLE SLEEVE PIPES

Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in earthenware or high-density polyethylene pipes.

The ends of all sleeves shall be sealed with a non-hardening watertight compound after the installation of cables. All sleeves intended for future use shall likewise be sealed.

2 NOTICES

The Contractor shall issue all notices and make the necessary arrangements with Supply Authorities, the Postmaster-General, and S.A. Transport Services, Provincial or National Road Authorities and other authorities as may be required with respect to the installation.

3 ELECTRICAL EQUIPMENT

All equipment and fittings supplied must be in accordance with the attached quality specification (Part 3 of this document), suitable for the relevant supply voltage, and frequency and must be approved by the Employers Electrical Engineer.

4 DRAWINGS

The drawings generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of power points, switches and light points that may be influenced by built-in furniture must be established on site, prior to these items being built in.

5 BALANCING OF LOAD

The Contractor is required to balance the load as equally as possible over the multiphase supply.

6 SERVICE CONDITIONS

All plant shall be designed for the climatic conditions appertaining to the service.

7 SWITCHES AND SOCKET OUTLETS

The installation of switches and socket outlets must conform to clause 13 of Part 1 of this specification.

7a. SHAVER SOCKETS

7a.1 Shaver sockets shall comprise a double wound isolating transformer rated at 20 VA.

7a.2 A three hole system shall be provided to provide for 115 V or 230 V systems and also to cater for various types of shaver plugs.

7a.3 Insertion of a shaver plug shall automatically switch on the unit by energising the primary side of the isolating transformer. Removal shall switch it off.

7a.4 The unit shall be protected against overload by a thermal overload device.

7a.5 The unit shall comply with BS 3052.

8 LIGHT FITTINGS AND LAMPS

The installation and mounting of luminaires must conform to clause 19 of Part 1 of this specification.

All fittings to be supplied by the Contractor shall have the approval of the Employer.

The light fittings must be of the type specified in the Schedule of Light Fittings.

9 EARTHING AND BONDING

The Contractor will be responsible for all earthing and bonding of the building and installation. The earthing and bonding installation is to be carried out strictly as described in clause 18 of Part 1 of this specification and to the satisfaction of the Employer/s Electrical Engineer.

10 MAINTENANCE OF ELECTRICAL SUPPLY

All interruptions of the electrical supply that may be necessary for the execution of the work, will be subject to prior arrangement between the Contractor and the Client and the Employer's Electrical Engineer.

11 EXTENT OF WORK

The work covered by this contract comprises the complete electrical installation, in working order, as shown on the drawings and as per this specification, including the supply and installation of all fittings and also the installation of such equipment supplied by the Employer.

12 SUPPLY AND CONNECTION

The supply will be at 400 / 230 Volt 50 Hz.

The Contractor must arrange in good time with Eskom for the upgrading of the two miniature substations, as specified.

The Contractor will be responsible for the supply and installation of the supply cables from the miniature substations as specified elsewhere in this Document. The size and length of the cables is listed in the Schedule of Cables and measured in the Bills of Quantities.

Standby Plant

The 300 kVA standby plants, complete with automatic changeover control panels (Distribution Board –) be supplied, installed and commissioned by others.

The Contractor will only be responsible for the supply and installation of the cable connections between the Main Distribution Board and the Charge- over Control Panel (Distribution Board - X).

The supply cables are listed in the Schedule of Cables and measured in the Bills of Quantities.

13 CONDUIT AND WIRING

Conduit and conduit accessories shall be black enameled / galvanized screwed conduit or black enameled / galvanized plain end conduit in accordance with SANS 61386.

All conduits, regardless of the system employed, shall be installed strictly as described in the applicable paragraphs of clauses 4 to 8 of Part 1 of the specification. Wiring of the installation shall be carried out as directed in clause 9 part 1 of this specification.

Where plain end conduit is offered all switches and light fittings must be supplied with a permanent earth terminal for the connection of the earth wire.

Lugs held by switch fixing screws or self tapping screws will not be acceptable.

13.1 Telephone Installation

The Contractor shall allow for the complete installation of all conduits, outlet boxes, the communication service provider Distribution boards, sleeve pipes, etc., required for the telephone system as shown on the drawings.

The sizes of all telephone conduits are indicated on the drawings and must be installed in the floor slab. Galvanized steel draw-wires shall be installed in all conduits.

End boxes must consist of a 50 mm x 100 mm x 100 mm outlet box fitted with suitable blank cover plates, flush mounted 0,4 m above floor level.

The communication service provider Distribution Board must consist of a 150 mm x 600 mm x 600 mm metal box and hinged door with a 20 mm thick wooden backboard. The board must be flush mounted, 1,37 m above the floor.

13.2 Intercom Installation

The supply and installation of the intercom system is not included in this Contract.

The Contractor shall allow for the complete supply and installation of all conduits and outlet boxes required for the intercom installation as shown on the drawings.

The size of all conduits, boxes and mounting heights of the end boxes are indicated on the drawings. Galvanized steel draw-wires shall be installed in all conduits and the boxes fitted with suitable blank cover plates.

13.3 Power Trunking

The Contractor shall be responsible for the supply and installation of all power trunking complete with corner pieces, end pieces, junction pieces, supply conduits, cover plates and power outlets as specified and indicated on the drawings.

The power trunking must comply with SANS 61084. The Contractor must ensure that the power trunking is installed to satisfaction of the Employer's Electrical Engineer before commencing with the wiring of the power trunking.

14 POWER POINTS

Allow for the installation of power points and equipment as listed in the schedule, indicated on the drawings and described below:

- 14.1 ELECTRIC STOVE
- 14.2 ELECTRIC COOKING TOP
- 14.3 WATER HEATERS, ETC.

[The power points required for the service must be specified in detail with reference to supplier of the equipment, method of installation and final connection. The size of the conduit/the conductors and cable must be listed in the Schedule of Power Points.]

Example: Water Heaters

The Contractor must electrically connect all water heaters as specified and listed in the Schedule of Power Points.

NOTE: The hot water installation must be approved by the Employers Electrical Engineer. Detail with regard to the size and type of water heaters that must be provided must be obtained from the Architect.

15 CABLES

The Contractor shall supply and completely install all distribution cables as indicated on the drawings, and listed in the Schedule of Cables.

The storage, transportation, handling and laying of the cables shall be according to first class practice, and the contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operations.

The cable-trenches shall be excavated to a depth of 0,9 m deep below ground level and shall be 450 mm wide for one to three cables, and the width shall be increased where more than three cables are laid together so that the cables may be placed at least two cable diameters apart throughout the run. The bottom of the trench shall be level and clean and the bottom and sides free from rocks or stones liable to cause damage to the cable.

The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and public and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage.

In the trenches the cables shall be laid on a 75 mm thick bed of earth and be covered with a 150 mm layer of earth before the trench is filled in.

All joints in underground cables and terminations shall be made either by means of compound filled boxes according to the best established practice by competent cable jointers using first class materials or by means of approved epoxy-resin pressure type jointing kits. Epoxy-resin joints must be made entirely in accordance with the manufacturer's instructions and with materials stipulated in such instructions.

Low tension PVCA cables are to be made off with sealing glands and materials designed for this purpose which must be of an approved make. Where cables are cut and not immediately made off, the ends are to be sealed without delay.

The laying of cables shall not commence until the trenches have been inspected and approved. The cable shall be removed from the drum in such a way that no twisting, tension or mechanical damage is caused and must be adequately supported at intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after drawing in of the cables.

Backfilling (after bedding) of the trenches is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150 mm. The surface is to be made good as required.

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

Earth continuity conductors are to be run with all underground cables constituting part of a low tension distribution system. Such continuity conductors are to be stranded bare copper of a cross-sectional area equal to at least half that of one live conductor of the cable, but shall not be less than 4 mm² or more than 70 mm². A single earth wire may be used as earth continuity conductor for two or more cables run together, branch earth wires being brazed on where required.

15.1 LAYING, JOINTING AND MAKING OFF OF ELECTRICAL CABLES

[The requirements specified hereafter, are aimed essentially at high tension cable but are also valid for low tension cable, where applicable.]

1. The use of the term "Inspector", includes the engineer or inspector of the Department or an empowered person of the concerned supervising consulting engineer's firm.
2. No cable is to be laid before the cable trench is approved and the soil qualification of the excavation is agreed upon by the Contractor and inspector.
3. After the cable has been laid and before the cable trench is back-filled the inspector must ensure that the cable is properly bedded and that there is no undesirable material included in the bedding layer.

4. All cable jointing and the making off of the cables must only be carried out by qualified experienced cable jointers. Helpers of the jointers may not saw, strip, cut, solder, etc. The cable and other work undertaken by them must be carried out under the strict and constant supervision of the jointer.
5. Before the Contractor allows the jointer to commence with the jointing work or making off of the cable (making off is recognized as half a joint) he must take care and ensure:
 - 5.1 That he has adequate and suitable material available to complete the joint properly and efficiently. Special attention must be given to ensure the cable ferrules and cable lugs are of tinned copper and of sufficient size. The length of the jointing lugs must be at least six times the diameter of the conductor,
 - 5.2 That the joint pit is dry and that all loose stones and material are removed,
 - 5.3 That the walls and banks of the joint pit are reasonable firm and free from loose material which can fall into the pit,
 - 5.4 That the necessary coffer-dams or retaining walls are made to stop the flow of water into the joint pit,
 - 5.5 That the joint pit is provided with suitable groundsheets so that the jointing work is carried out in clean conditions,
 - 5.6 That the necessary tents or sails are installed over the joint pit to effectively avert unexpected rainfall and that sufficient light or lighting is provided,
 - 5.7 That the necessary means are available to efficiently seal the jointing or cable end when an unexpected storm or cloudburst occurs, regardless of how far the work has progressed,
 - 5.8 That the cables and other materials are dry, undamaged and in all respects are suitable for the joint work or making off,
 - 5.9 That the heating of cable oil, cable compound, plumber's metal and solder is arranged that they are at the correct temperature when required so that the cable is not unnecessarily exposed to the atmosphere and consequently the ingress of moisture (care must be taken of overheating)

Flow temperatures of cable oil and compound must be determined with suitable thermometers. Cable oil and compound must not be heated to exceed the temperatures given on the containers and precautions must be taken to ensure that the tin is not overheated in one position. The whole mass must be evenly and proportionally heated.

(Temperatures of solder and plumber's metal may be tested with brown paper (testing time: 3 seconds). The paper must colour slightly - not black or burnt).

6. Before the paper-insulated cables are joined, they must be tested for the presence of moisture by the cable jointers test. This consists of the insertion of a piece of unhandled insulated impregnated paper tape in warm cable oil heated to a temperature of 130 ± 5 °C.

Froth on the surface of the oil is an indication that moisture is present in the impregnated insulation and the amount of the froth gives an indication of the moisture present.

7. If the cable contains moisture or is found to be otherwise unsuitable for jointing or making of the inspector is to be notified immediately and he will issue the necessary instruction to cope with the situation.
8. The joint or making off of paper insulated cables must not be commenced during rainy weather.
9. Once a joint is in progress the jointer must proceed with the joint until it is complete and before he leaves the site.
10. The jointer must ensure that the material and his tools are dry at all times, reasonably clean and absolutely free from soil.
11. Relating to the jointing of the cable the following requirements apply:
 - 11.1 All jointing must be carried out in accordance with recognized and tried techniques and comply strictly with the instructions given by the supplier of the jointing kit.

- 11.2 The cables must be twisted by hand so that the cores can be joined according to the core numbers. If necessary, the cable is to be exposed for a short distance to accomplish this. Under no circumstances may the cores in a joint be crossed so as to enable cores to be joined according to the core numbers. If it is not possible to twist the cables so that the preceding requirements can be met, then cores are to be joined in the normal way without any consideration of the core numbers.
- 11.3 Normally the cables will have profile conductors. The conductors shall be pinched with gas pliers to form a circular section, bound with binding wire so that they do not spread, and then tinned before jointing.
- 11.4 Jointing ferrules, the length of which are at least 6 times the diameter of the conductors, must be slid over the conductor ends to be joined and pinched tightly. Then they are soldered by means of the ladle process whilst being pinched further closed.

Use resin only as a flux. The slot opening in the ferrule must be completely filled, including all depressions.

Remove all superfluous metal with a cloth dipped in tallow. Work during the soldering process must be from top to bottom. Rub the ferrule smooth and clean with aluminium oxide tape after it has cooled down to ensure that there are not any sharp points or edges.

NB: The spaces between the conductor strands must be completely filled by soldering process and must be carried out quick enough to prevent the paper insulation from burning or drying out unnecessarily.

- 11.5 After the ferrules have been rubbed smooth and clean, they and the exposed cores must be treated with hot cable oil (110 °C) to remove all dust and moisture. These parts are to be thoroughly basted with the oil.
- 11.6 The jointer must take care that his hands are dry and clean before the joint is insulated. Also the insulating tape which is to be used must first be immersed in warm cable oil (110 °C) for a sufficient period to ensure that no moisture is present.
- 11.7 After the individual cores have been installed, they must be well basted with hot cable oil and again after the applicable separator and/or belt insulation tape is applied before the lead joint sleeve is placed in position.

- 11.8 The lead joint sleeve must be thoroughly cleaned and prepared before it is placed on the cable and must be kept clean during the whole jointing process. Seal the filling apertures of the sleeve with tape until the sleeve is ready for compound filling.
- 11.9 The plumbing joints employed to solder the joint sleeve to the cable sheath, must be cooled off with tallow and the joint sleeve is to be filled with compound while it is still warm. Top up continuously until the joint is completely filled to compensate for the compound shrinkage.
- 11.10 The outer joint box must be clean and free from corrosion. After it has been placed in position it must be slightly heated before being filled with compound. Top up until completely full.
12. As far as cable end boxes are concerned the requirements as set out above are valid where applicable.

16. HEAT PUMP INSTALLATION

16.1 INTRODUCTION

The purpose of this specification is to provide the requirements, in terms of supply and installation, of hot water geysers and heat pumps.

16.2 INSTALLATION SPECIFICATION

The hot water system will consist of a 5 kW heat pump and 200 litre geyser. The geyser will be installed with the hot water outlet at an equal height as to the dispensing unit. The heat pump will be installed with the hot water outlet at a height equal to the inlet to the geyser. The hot water outlet of the geyser shall not be further away than 1 metre from the wall hole to the dispensing unit.

The geyser will be wall mounted with wall mounting brackets specifically designed for wall mounting of the specified geyser. The geyser will be fully wrapped with a geyser blanket of the correct size and will be specifically designed for the intended purpose of hot water geyser isolation.

The heat pump will be wall mounted with wall mounting brackets specifically designed for wall mounting of the specified heat pump and be correctly rated for the weight of the unit.

The electrical supply of the heat pump will be obtained from the normal power section of the main distribution board of the facility. A 20 A 1-pole circuit breaker will be installed in the distribution board.

The supply wiring from the distribution board to the heat pump isolator shall be made of 6 mm² conductors and a 4 mm² earth conductor.

A 30 A 2-pole isolator will be wall mounted within 1 meter from the heat pump unit and at the opposite side of the heat pump as the geyser unit. The isolator will be mounted inside a weather proof enclosure with sliding lid.

All water piping forming part of the installation shall be insulated for heat loss using only insulation material specifically designed for the intended purpose. The return cycle water pipe between the geyser and heat pump will also be fully insulated.

Equipment manuals (three off) to be supplied with the unit.

17. DISTRIBUTION BOARDS

In addition to clause 14 and clause 15 of Part 1 of this specification the following shall also be applicable to switchboards required for this service.

The Contractor shall supply and install the distribution boards as indicated on the drawings and listed in the Distribution Board Schedule. All distribution boards shall comply with the quality specification in Part 3 of this specification and be approved by the Employer's Electrical Engineer.

The following types of distribution boards are required for the service:

[All buildings and the types of boards required for the service must be listed.

The latest Departmental Quality Specification Section for Distribution Boards must be included in Part 3 of the specification.]

18. SCHEDULE OF LIGHT FITTINGS

The Departmental Quality Specification for the relevant luminaires must be included in Part 3 of the specification.

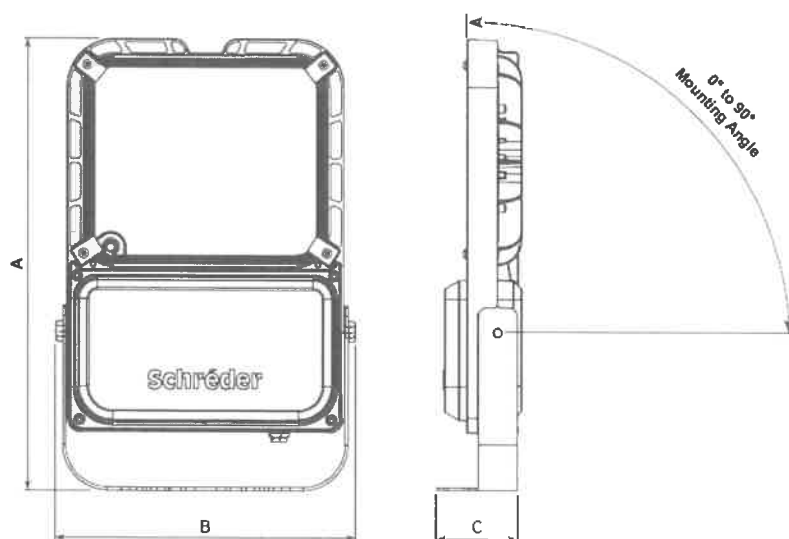
The light fittings and accessories are to be according to the quality specifications in Part 3 and shall be approved by the Employer / Engineer / Architect.

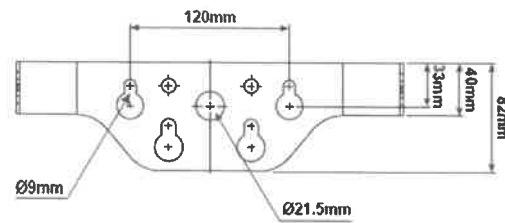
Type A: A multi-purpose LED luminaire for lighting areas where high lumen per watt are needed offering maximum savings in energy and maintenance costs with a short payback time. This luminaire to be installed using the standard pole mounted casting. An LED solution with low energy consumption, improved visibility with white light, limited maintenance and longer life.

With an efficient thermal management of both the LEDs and the power supply thanks to the separation between the optical unit and the gear box. The cooling fins on the optical unit optimize the heat dissipation. To perfectly manage high ambient temperatures (T_a up to 40°C) to ensure reliability in the long term.

The luminaire housing is manufactured of high-pressure die-cast aluminum. To withstand even the most corrosive environments, the luminaire housing is especially e-coated (optional).

With an LED light source of 128 LED's (75 W) with nominal flux of 11 480 lumens.





Type B: This post top luminaire provides a new contemporary design for a well-known shape using state-of-the-art LED technology. It consists of a high-pressure die-cast marine grade aluminium (EN 1706 AC-44300) base and gear plate, a top cover made of Acrylonitrile Styrene Acrylate (ASA) and a high-impact acrylic protector for durability and weather resistance.

The luminaire emits a pleasant, glare-free light due to the highly efficient white reflector (symmetrical light distribution). A faceted reflector is available as an option (asymmetrical distribution). The complete luminaire is sealed to IP 66. Electronic temperature monitoring prevents overheating of LEDs and power supply, positioned directly next to LEDs (ThermiX®). It is designed for LED light source of 43W, mounted on a 4,6 m (4,0 m mounting height) GRP pole.



Type F4: DESIGNED FOR ENERGY-EFFICIENT LIGHTING SOLUTIONS FOR MAXIMUM VISUAL COMFORT AND OPTIMUM LIGHT DISTRIBUTION IN MULTI-USE INDOOR ENVIRONMENTS.

Recessed LED panel light fitting, 600 x 1 200 mm, c/w 48 W LED lamp.

The luminaire shall consist of a polycarbonate and aluminum body and an opal diffuser.

A flicker free non-dimming driver is standard equipped.

It is available in 1 200 mm * 600 mm. It is ideal for exposed grid suspended ceilings. A surface mounted, mild steel powder coated enclosure is optional for surface mounting requirements.

The luminaire shall bear the SANS 60598-2-1 safety mark and shall have an ingress protection of IP20 in compliance with SANS 60529, certified by an SABS test report.

Use of high efficiency LED's >100 lumens per watt and CRI >80.

The standard LED's colour temperature provided shall be neutral white (4000K).

The BEKA LED PANEL LUMINAIRE shall operate LED light source of up to 48W, in ambient temperatures between -10°C up to 40°C, without reducing the LED lifetime of 30 000hrs, at a lumen depreciation of not more than 30% (L70).

The driver shall operate at a power factor of >0,90 and the total harmonic distortion levels are < 20% and do not cause interference on the electrical network.

For ease of installations, a quick wiring connection is provided.

Type F4e: The fitting is the same as Type F4, above.

Recessed LED panel light fitting, 600 x 1 200 mm, c/w 48 W LED lamp and 1 hr Emergency lighting at 12% of normal output.

Type F7: DESIGNED FOR ENERGY-EFFICIENT LIGHTING SOLUTIONS FOR MAXIMUM VISUAL COMFORT AND OPTIMUM LIGHT DISTRIBUTION IN MULTI-USE INDOOR ENVIRONMENTS.

Recessed LED panel light fitting, 600 x 600 mm, c/w 30 W LED lamp.

The luminaire shall consist of a polycarbonate and aluminum body and an opal diffuser.

A flicker free non-dimming driver is standard equipped.

It is available in 600 mm * 600 mm. It is ideal for exposed grid suspended ceilings. A surface mounted, mild steel powder coated enclosure is optional for surface mounting requirements.

The luminaire shall bear the SANS 60598-2-1 safety mark and shall have an ingress protection of IP20 in compliance with SANS 60529, certified by an SABS test report.

Use of high efficiency LED's >100 lumens per watt and CRI >80.

The standard LED's colour temperature provided shall be neutral white (4000K).

The BEKA LED PANEL LUMINAIRE shall operate LED light source of up to 48W, in ambient temperatures between -10°C up to 40°C, without reducing the LED lifetime of 30 000hrs, at a lumen depreciation of not more than 30% (L70).

The driver shall operate at a power factor of >0,90 and the total harmonic distortion levels are < 20% and do not cause interference on the electrical network.

For ease of installations, a quick wiring connection is provided.

Type F7e: The fitting is the same as Type F7, above.

Recessed LED Panel light fitting, 600 x 600 mm, c/w 30 W LED lamp and 1 hr Emergency lighting at 12% of normal output.

Type F9: A robust and efficient, surface mounted LED Vapour Proof luminaire with a 46 W LED lamp, with SABS mark or SABS mark of compliance.

The Vapourline (VLN) luminaire consists of an injection-moulded, flame-retardant polycarbonate housing and prismatic diffuser.

The powder coated white LED plate is secured into the diffuser that also houses the motion sensor; all other electrical components are mounted inside the housing, the diffuser clips securely onto the housing.

The silicon sponge seal is moulded into the housing to ensure an optimal seal between the housing and the diffuser.

A suspension hanger is provided to allow the easy installation of the fitting.

It is designed to operate LEDs of up to 46 W.

The luminaire shall bear the SANS 475 performance mark and the SANS 60598-2-3 safety mark.

The luminaire shall have a degree of protection that complies with SANS 60529: LED compartment: IP65

The IP rating is to be supported by a certified SABS test report.

The LED engine, consisting of the LED light source and the power supply. To maximize the reliability of the LED's, the photometrical engine is completely sealed to IP65. This ensures that the photometric performance is maintained over time. The IP65 rating is ensured by means of a silicon sponge gasket fixed into a groove to seal.

The high-impact polycarbonate protector allows for impact resistance of IK08.

All control gear components are removable and bear the relevant Quality mark. All internal wiring to be Teflon® coated to prevent damage by possible abrasion.

The closing clips and all screws and metal parts are stainless steel or non-corrosive material. Mains connections by means of a suitable screw terminal block with a wire clamping contact. The luminaire power factor corrected to a minimum of 0,95.

The IP65 LED housing compartment optimizes the thermal operating environment around the LEDs enabling the long useful lifetime (60 000 hrs, L70). With the introduction of LED technology Dimming options are much easier and further maximize energy savings.



Type F9e: **The fitting is the same as Type F9, above.**

A robust and efficient, surface mounted LED Vapour Proof luminaire with a 46 W LED lamp, and 1 hr Emergency Lighting.

Type G: **Wall mounted, bed light.**

Rectangular wall mounted LED luminaire manufactured from die-cast aluminium, 100 x 75 mm (H x D), white in colour, c/w a 10 W LED lamp with luminous flux of 1 100 lm, colour temperature 3000 K.

BALLAD DOWN-FACING HALF-DISC BULKHEAD

Fitting Code: B148W

Fitting Colour: White

IP Rating: 65

Lens/Shade Material: Polycarbonate

Fitting Material: Aluminium

Height: 195 mm

Width: 300 mm

Depth: 135 mm

Max Lamp 1: Not Included 2 x G24d-2 18 W PL CFL (Cool White)



Type J: Light Emitting Diode (LED) and High Intensity Discharge (HID) Bulkhead Luminaire Designed for Industrial, Perimeter and Security Lighting Applications where High Lumen Output is Required, c/w 32 W LED Lamp, with SABS mark or SABS mark of compliance.

The luminaire shall consist of a high-pressure die-cast aluminium body with non-discolouring prismatic high-impact acrylic diffuser bowl and shall be designed to operate a **32 W LED** lamp (96 LEDs).

The luminaire shall bear the SANS 60598-2-1 safety mark.

The luminaire shall have a degree of protection that complies with SANS 60529:

Lamp compartment: IP 66.

The IP rating shall be certified by an SABS test report.

The LED luminaire shall be designed with high efficient LEDs, 4 000 K at a colour rendering index >70, and a minimum 50 000 hours lifetime (L70). It shall have an operating temperature (T_a) rating of -20 °C to +40 °C. It shall be designed to retrofit 70 W and 100 W high pressure sodium and mercury vapour installations.

The body shall be manufactured from high-pressure die-cast aluminium. It shall be supplied with three mounting holes, but can also be supplied with no holes in the body, using mounting lugs instead, on request. Electrical cable entry shall be via a compression type gland at the rear of the luminaire, but other entries can be provided on request.

A high-pressure die-cast aluminium decorative skirt assembly shall be available for architectural applications.

The body can be semi-recessed or surface mounted. It shall be available for Zone 2, 21 and 22 applications.

The diffuser bowl shall be manufactured from non-discolouring injection moulded high-impact acrylic. The prisms shall be restricted to the inside of the bowl and shall be carefully formed to work in conjunction with the reflector to provide a spacing to mounting height ratio of up to 8:1, whilst controlling excessive glare.

The frame assembly shall be held to the body by four stainless steel M6 Allen head captive screws located outside the sealed lamp compartment.

A high-purity, single-piece, die-formed aluminium reflector shall be mounted on the reflector back plate. An internal eyelid shall be available as an option when the luminaire is mounted in a vertical position against buildings, providing effective perimeter lighting.

The control gear shall be mounted directly onto the body to provide optimum heat dissipation. It shall be suitable for operation with the specified rating of the lamp on a 230 V +3%/-10% 50 Hz single phase system. All internal wiring shall be Teflon[®] coated with protective sleeving to prevent damage by possible abrasion.

All external screws, bolts and metal parts shall be stainless steel or non-corrosive material. Ignitors, where applicable, shall be of the superposed pulse type.

The luminaire shall be power factor corrected to a minimum of 0,9.



Type K: Rectangular decorative bulkhead light fitting with 1 x 8 W LED lamp, c/w 1 hr emergency standby, with SABS mark or SABS mark of compliance.

The luminaire base and trim ring is manufactured of a high-pressure die-cast marine grade aluminium (EN 1706 AC-44300). The trim ring casting is mounted onto the base casting by means of stainless steel M5 Allen head screws, located outside the lamp compartment.

The base and trim are finished with epoxy powder coating. It shall be simple to install due to four mounting holes provided outside the lamp compartment through lugs that form part of the base casting.

A clear prismatic or opal non-discolouring high impact acrylic injection moulded diffuser is used throughout the range. It shall offer excellent vandal resistance, be highly translucent and shall not discolour even when subjected to the harshest UV environments. A silicon sponge gasket shall be fitted into a special groove in the diffuser to prevent damage to the gasket during installation and to achieve the certified ingress protection rating of IP 65. It shall be designed to operate LEDs of 1095 lm (8 W). The luminaire shall be supplied with a 300 mm supply lead.

The luminaire shall bear the SANS 60598-2-1 safety mark.

IP66 in compliance with SANS 60529.

The IP rating shall be certified by a SABS test report.

The incorporated reflector shall be manufactured from 99.98% super pure deep anodized aluminium for optimal downward light output. The trim ring casting shall be mounted onto the base casting by stainless steel M5 Allen head screws, located outside the lamp compartment. The fixing holes can be supplied with stainless steel helicoil inserts on request.

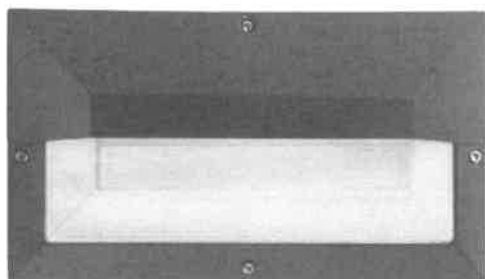
A clear prismatic or opal non-discolouring high impact acrylic injection moulded diffuser shall be used throughout the range. It shall offer excellent vandal resistance, shall be highly translucent and will not discolour even when subjected to the harshest UV environments.

A silicon sponge gasket shall be fitted into a special groove in the diffuser to prevent damage to the gasket during installation. It shall fit snugly over a tongue provided on the base casting, thus achieving the certified ingress protection rating of IP66.

The eyelid trim ring casting shall be manufactured from high pressure die cast aluminium and shall be finished in a special multi-stage epoxy powder surface coating.

The electrical control gear shall be mounted directly onto the base casting. It shall be suitable for operation with the specified rating of the lamp on a 220 V - 240 V $\pm 10\%$ 50 Hz single phase system.

All inter-connecting wiring shall be Teflon® insulated with protective sleeving to prevent damage by possible abrasion. All external screws, bolts and metals shall be stainless steel or of non-corrosive material.



Type M: **Round LED bulkhead, manufactured from high quality materials to ensure a high ingress protection and non-discolouring diffuser. The diffuser to have a plug connector to easily separate the LED compartment from the base, to allow for easy installation, c/w LEDs of 21 W and 1 hr emergency standby, with SABS mark or SABS mark of compliance.**

This round LED bulkhead is specially designed to offer a modern, elegant yet high quality area lighting option for applications like commercial developments, retail areas, shopping malls and public buildings.

High-quality materials are used to ensure a high ingress protection and non-discolouring diffuser. This together with the long lifetime of the LED's, and an easy installation procedure, makes the SERIES 300 the bulkhead of choice.

The specially designed closing mechanism seals the LED compartment permanently to IP65 and also eliminates tampering with the LED's.

A Silicone gasket in a tongue in groove-designed interface ensures an IP65 ingress protection between the LED compartment and the driver compartment. This allows to minimize damage and the reduction of the lifetime and performance of the luminaire.

The bulkhead also has a plug connector easily separating the LED compartment from the base to allow for easy installation.

The newest LED technology has been utilized to maximize performance and to optimize thermal dissipation between the LEDs and the Aluminium housing. Thereby, the bulkhead is able to last at least 50 000 hours in the applicable environments.

The design can operate LEDs of 21 W.

The luminaire shall bear the SANS 60598-2-3 safety mark.

The luminaire shall have a degree of protection that complies with SANS 60529:

LED compartment: IP 65

Gear compartment: IP 65

The IP rating is supported by a certified SABS test report.

The high-impact clear acrylic protector allows for impact resistance of IK06.

All internal wiring are Teflon® coated to prevent damage by possible abrasion.

All screws, bolts and metal parts are stainless steel or non-corrosive material. Mains connections by means of a supplied cable for easy installation. The luminaire power factor corrected to a minimum of 0,95.

The IP65 LED housing compartment optimizes the thermal operating environment around the LEDs enabling the long useful lifetime (50 000 hrs, L70).



Type N: **Wash hand basin light.**
Polished Chrome and Glass LED “Picture” Light.
Luminaire to have an IP 66 rating.
– 12 W LED (Included)
1 x LED Power Supply (Included)
4000 K
960 Lumen
Length: 600 mm
Width: 52 mm
Depth: 60 mm



Type P: **Study light**
Rectangular wall mounted luminaire manufactured from extruded aluminium with a frosted acrylic diffuser, body colour to Architect's specification, c/w a 27 W LED lamp c/w a Tridonic LED module and driver, 4 640 lm, colour temperature of 4000 K, body dimensions approximately 1 126 x 62 x 90 mm (L x W x H).





Type R: Recessed LED down light with 16 W High-Efficiency LED lamp, c/w 1 hr emergency standby, with SABS mark or SABS mark of compliance.

High-efficiency luminaire consisting of a pressed metal ceiling trim, reflector, ceiling brackets and reinforced luminaire frame. Designed to operate LED light sources of up to 9 W to 23 W in an ambient temperature environment of up to 35 °C, without reducing the useful lifetime of 50 000 hours (Eco) or 60 000 hours (High-efficiency), at a lumen depreciation of not more than 30% (L70).

The easy-fixing ceiling brackets are made of spring steel to ensure rigid and positive mounting in the ceiling, eliminating any sagging of the luminaire. Effective high-power LED, 3 000 K or 4 000 K, at a colour rendering index ≥ 80 . The 99.9% pure aluminium reflector is made from pressed grade 1050 aluminium alloy.



Type R1: Bathroom light

Recessed mounted round, enclosed downlight manufactured from die-cast aluminium with an Opal Polycarbonate lens and spring clips, c/w 1 x 9 W Integrated LED lamp, luminous flux of 720 lm, colour temperature of 4000 K, an IP Rating of at least 65, and a beam angle of 120°.

Type EXIT: Ceiling mounted emergency exit light

Emergency standby exit light manufactured from Polycarbonate with ECO116 sign, approximate dimensions of 245 x 82 x 56 mm, complete with maintained (3 hrs) 130 lumen LED light. Degree of protection of IP66, IK06. High-temperature resistant Ni-Cd, Ni-Mh rechargeable accumulators. Protection against excessive battery discharge. Including an LED charge indication light. With overcurrent protection.

GRP Poles

The pole shall be constructed by the filament winding process to achieve optimum results for strength and rigidity. The filament winding process shall be continuously applied with uniform tension onto a rotating mandrel and shall result in a minimum mass glass to resin ratio of 70:30. The surface shall be seamless, smooth and tapered.

The material of the finishing coat shall be a gel coat that shall comply with the requirements of SANS 141:2006 and shall be applied to a uniform thickness of between 250 and 500 microns. It shall provide a weatherproof, UV resistant, flame resistant and impact strong surface in the colour specified.

A standard pole supporting a luminaire with a wind surface of 0,20 m² shall not have a pole top deflection of more than 5% of its height above ground when subjected to a basic wind pressure of 500 Pa. A safety factor of 2,5 times the total maximum windload shall be applicable.

The pole shall be manufactured in accordance with SANS 1749 under the ISO 9002 quality system.

If an access opening is required, the cut-out shall be covered by an access door cover manufactured from glass filled nylon impregnated in the same colour as that of the surface coat. It shall be secured to the pole by two stainless steel Allen head captive screws into M4 brass inserts embedded in the pole.

A cable entry with a minimum diameter of 34 mm shall be provided at a minimum depth of 400 mm below the ground surface.

A hot dipped galvanised gland plate, suitable for gland no. 0 or 1, complete with terminal block and DIN rail for a miniature circuit breaker, shall be provided and shall be mounted to a bolt provided in the access opening.

Poles for direct embedment in the ground shall be provided with a 300 x 300 x 1,6 mm hot dipped galvanised baseplate complete with 2 x hot dipped galvanised steel hookbolts and nuts. Base mounted poles shall have a hot dipped galvanised flange plate that can be bolted to a foundation which shall be designed to withstand the forces the pole will experience in service.

RELEVANT POLE DATA AND OTHER FACTORS			CORRESPONDING CALCULATED KEY VALUES	
Total length of pole m	Height of pole above ground m	Diameter of pole at ground level mm	Load to be applied in pole-top deflection test N	Maximum permitted deflection in pole-top deflection test mm
4.1	3.5	135	161.0	175
9.2	8.0	202	265.5	400

NOTES:

1. Relevant pole data is based on a shape factor of 0,7 and a calculated wind pressure of 500,14 Pa.
2. Corresponding calculated key values are based on a luminaire surface area of 0,2 m² with a shapefactor of 1.

19. HEAT PUMP INSTALLATION

19.1 INTRODUCTION

The purpose of this specification is to provide the requirements, in terms of supply and installation, of hot water geysers and heat pumps.

19.2 INSTALLATION SPECIFICATION

The hot water system will consist of either a 3,5 kW heat pump and 100 / 150 litre geyser or a 5,5 kW heat pump and a 200 litre geyser. The geyser will be installed with the hot water outlet at an equal height as to the dispensing unit. The heat pump will be installed with the hot water outlet at a height equal to the inlet to the geyser. The hot water outlet of the geyser shall not be further away than 1 metre from the wall hole to the dispensing unit.

The geyser will be wall mounted with wall mounting brackets specifically designed for wall mounting of the specified geyser. The geyser will be fully wrapped with a geyser blanket of the correct size and will be specifically designed for the intended purpose of hot water geyser isolation.

The heat pump will be wall mounted with wall mounting brackets specifically designed for wall mounting of the specified heat pump and be correctly rated for the weight of the unit.

The electrical supply of the heat pump will be obtained from the normal power section of the main distribution board of the facility. A 20 A 1-pole circuit breaker will be installed in the distribution board.

The supply wiring from the distribution board to the heat pump isolator shall be made of 6 mm² conductors and a 4 mm² earth conductor.

A 30 A 2-pole isolator will be wall mounted within 1 meter from the heat pump unit and at the opposite side of the heat pump as the geyser unit. The isolator will be mounted inside a weather proof enclosure with sliding lid.

All water piping forming part of the installation shall be insulated for heat loss using only insulation material specifically designed for the intended purpose. The return cycle water pipe between the geyser and heat pump will also be fully insulated.

Equipment manuals (three off) to be supplied with the unit.

20. SCHEDULE OF CABLES, CONDUIT AND WIRING

Supply, install and connect the following cable, conduit and wiring:

From	To	Size	Earth Wire	Length
Mini-sub THLB 5	Generator_1	4 x 150 mm ² x 1- core	70 mm ²	15 m
Generator_1	DB-G1(E)	1 x 120 mm ² x 4- core	70 mm ²	75 m
Generator_1	DB-G2(E)	1 x 95 mm ² x 4- core	70 mm ²	90 m
DB-G2(E)	DB-G2_1(E)	4 x 25 mm ² x 1- core	16 mm ²	5 m
Generator_1	DB-G3(E)	1 x 70 mm ² x 4- core	50 mm ²	65 m
DB-G3(E)	DB-G3_1(E)	4 x 25 mm ² x 1- core	16 mm ²	5 m
Generator_1	DB-K(E)	1 x 50 mm ² x 4- core	35 mm ²	55 m
Generator_1	DB-GH(E)	1 x 16 mm ² x 4- core	10 mm ²	75 m
Generator_1	DB-PH(E)	1 x 16 mm ² x 4- core	10 mm ²	90 m
DB-PH(E)	DB-PA(E)	1 x 16 mm ² x 4- core	10 mm ²	25 m

Mini-sub THLB 5	DB-G2_Normal	1 x 25 mm ² x 4- core	16 mm ²	90 m
DB-G2_Normal	DB-G2_1_Normal	4 x 25mm ² x 1-core	16 mm ²	5 m
Mini-sub THLB 5	DB-G3_Normal	1 x 25 mm ² x 4- core	16 mm ²	65 m
DB-G3_Normal	DB-G3_1_Normal	4 x 25 mm ² x 1- core	16 mm ²	5 m
Mini-sub THLB 5	DB-K_Normal	1 x 95 mm ² x 4- core	70 mm ²	55 m

Mini-sub THLB 6	Generator_2	4 x 150 mm ² x 1- core	70 mm ²	10 m
Generator_2	DB-G(E)	1 x 35 mm ² x 4- core	25 mm ²	25 m
DB-G(E)	DB-GA(E)	4 x 35 mm ² x 1- core	25 mm ²	10 m
Generator_2	DB-W(E)	1 x 95 mm ² x 4- core	70 mm ²	55 m
DB-W(E)	DB-W_1(E)	4 x 25 mm ² x 1- core	16 mm ²	5 m
Generator_2	DB-H(E)	1 x 95 mm ² x 4- core	70 mm ²	55 m
DB-H(E)	DB-H_1(E)	4 x 25 mm ² x 1- core	16 mm ²	5 m
Generator_2	DB-N(E)	1 x 95 mm ² x 4- core	70 mm ²	80 m
DB-N(E)	DB-N_1(E)	4 x 25 mm ² x 1- core	16 mm ²	5 m
Generator_2	DB-E(E)	1 x 70 mm ² x 4- core	50 mm ²	65 m
DB-E(E)	DB-E_1(E)	4 x 25 mm ² x 1- core	16 mm ²	5 m
Mini-sub THLB 6	DB-W_Normal	1 x 35 mm ² x 4- core	25 mm ²	55 m
DB-W_Normal	DB-W_1_Normal	4 x 25 mm ² x 1- core	16 mm ²	5 m
Mini-sub THLB 6	DB-H_Normal	1 x 35 mm ² x 4- core	25 mm ²	55 m
DB-H_Normal	DB-H_1_Normal	4 x 25 mm ² x 1- core	16 mm ²	5 m

Mini-sub THLB 6	DB-N_Normal	1 x 35 mm ² x 4- core	25 mm ²	80 m
DB-N_Normal	DB-N_1_Normal	4 x 25 mm ² x 1- core	16 mm ²	5 m
Mini-sub THLB 6	DB-E_Normal	1 x 35 mm ² x 4- core	25 mm ²	65 m
DB-E_Normal	DB-E_1_Normal	4 x 25 mm ² x 1- core	16 mm ²	5 m

21. SCHEDULE OF DISTRIBUTION BOARDS

The front panels of normal supply, standby power and no-break supply sections shall be painted in distinctive colours as follows:

Normal supply	:	Light Orange, colour B26 of SANS 1091.
Standby power	:	Signal Red, colour A11 of SANS 1091.
No-break supply	:	Dark Violet, colour F06 or Olive Green, Colour H05 of SANS 1091.

Indicated is the probable fault level rating (kA) of the busbars. Refer to the Summary of Switchgear and Circuits for the minimum fault level rating of specified equipment.

Block H: DB-G1:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block A, GF: DB-G2:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block A, GF: DB-G2_Normal:	Separate panel on DB-G2:	Normal Power: 6 kA;
Block A, FF: DB-G2_1:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block A, FF: DB-G2_1_Normal:	Separate panel on DB-G2_1:	Normal Power: 6 kA;
Block B, GF: DB-G3:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block B, GF: DB-G3_Normal:	Separate panel on DB-G3:	Normal Power: 6 kA;
Block B, FF: DB-G3_1:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block B, FF: DB-G3_1_Normal:	Separate panel on DB-G3_1:	Normal Power: 6 kA;
Block C, GF: DB-W:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block C, GF: DB-W_Normal:	Separate panel on DB-W:	Normal Power: 6 kA;
Block C, FF: DB-W_1:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block C, FF: DB-W_1_Normal:	Separate panel on DB-W_1:	Normal Power: 6 kA;
Block D, GF: DB-H:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block D, GF: DB-H_Normal:	Separate panel on DB-H:	Normal Power: 6 kA;
Block D, FF: DB-H_1:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block D, FF: DB-H_1_Normal:	Separate panel on DB-H_1:	Normal Power: 6 kA;
Block E, GF: DB-N:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block E, GF: DB-N_Normal:	Separate panel on DB-N:	Normal Power: 6 kA;
Block E, FF: DB-N_1:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block E, FF: DB-N_1_Normal:	Separate panel on DB-N_1:	Normal Power: 6 kA;

Block F, GF: DB-E:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block F, GF: DB-E_Normal:	Separate panel on DB-E:	Normal Power: 6 kA;
Block F, FF: DB-E_1:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Block F, FF: DB-E_1_Normal:	Separate panel on DB-E_1:	Normal Power: 6 kA;
Library: DB-G:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Library Sub-DB: DB-GA:	Surface, wall mounted:	Standby Power: 6 kA;
Kitchen: DB-K(E):	Surface, floor mounted against wall:	Standby Power: 6 kA;
Kitchen: DB-K_Normal:	Separate panel on DB-K(E):	Normal Power: 6 kA;
Gate House: DB-GH:	Flush, wall mounted:	Standby Power: 6 kA;
Pump House: DB-PH:	Semi-flush, wall mounted:	Standby Power: 6 kA;
Parking Area: DB-PA:	Surface mounted:	Standby Power: 6 kA.

22. SUMMARY OF SWITCHGEAR AND CIRCUITS

The indicated fault current rating (kA) is the minimum value that the switchgear must comply with for connecting to the busbars of the respective panels-distribution boards.

22.01 MINIATURE SUBSTATION THLB 5

<u>PANEL – 1</u>	:	<u>NORMAL POWER</u>
Main switch	:	1 x 600 A Triple pole 35 kA switch disconnecter
Generator_1	:	1 x 450 A Triple pole 20 kA mcb
<u>PANEL – 2</u>	:	<u>NORMAL POWER</u>
DB-G2_Normal_Power	:	1 x 63 A Triple pole 6 kA mcb
DB-G3_Normal Power	:	1 x 63 A Triple pole 6 kA mcb
DB-K_Normal_Power	:	1 x 63 A Triple pole 6 kA mcb

22.02 STANDBY GENERATOR 1

<u>PANEL - 1</u>	:	<u>STANDBY POWER (SIGNAL RED COVER PLATE)</u>
Main switch	:	1 x 450 A Triple pole 20 kA switch disconnecter
Gate House DB (DB-GH<E>)	:	1 x 63 A Triple pole 10 kA mcb
DB-G1<E> (Telcom Operator)	:	1 x 200 A Triple pole 20 kA mcb
DB-G2<E> (Block A Ground Floor)	:	1 x 150 A Triple pole 20 kA mcb

DB-G3<E> (Block B Ground Floor)	:	1 x 125 A Triple pole 20 kA mcb
DB-K<E> (Kitchen)	:	1 x 150 A Triple pole 20 kA mcb
DB-PH<E> (Pump House)	:	1 x 63 A Triple pole 10 kA mcb

22.03 GATE HOUSE DISTRIBUTION BOARD: DB-GH(E)

PANEL – 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main switch	:	1 x 63 A Triple pole 10 kA switch disconnecter
Lighting Controls	:	1 x L5504RVF 4 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Guard House Lights	:	1 x 10 A Single pole 6kA mcb
Car Canopy Lights	:	1 x 10 A Single pole 6 kA mcb
External Lights	:	1 x 10 A Single pole 6 kA mcb
Socket outlets	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 1 x 10 A Single pole 6 kA mcb
Dedicated Sockets	:	1 x 10 A Single pole 6 kA mcb
Wall Heater	:	1 x 10 A Single pole 6 kA mcb

22.04 PUMP HOUSE DISTRIBUTION BOARD: DB-PH(E)

PANEL – 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main switch	:	1 x 63 A Triple pole 10 kA switch disconnecter
Lighting Controls	:	1 x L5504RVF 4 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Pump House Lights	:	1 x 10 A Single pole 6 kA mcb
Pump House External Lights	:	1 x 10 A Single pole 6 kA mcb
Socket outlets	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 1 x 20 A Single pole 6 kA mcb
Pumps	:	2 x 63 A Triple pole mcb's
Parking Area Distribution Board	:	1 x 63 A Single pole mcb

22.05 PARKING AREA DISTRIBUTION BOARD : DB-PH(E)

PANEL – 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main switch	:	1 x 63 A Double pole 6 kA switch disconnecter
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Parking Area Lights	:	3 x 10 A Single pole 6kA mcb's
Socket outlets	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 4 x 20 A Single pole 6 kA mcb's

22.06 BLOCK A (TELCOM OPERATOR) DISTRIBUTION BOARD : DB-G1(E)

PANEL - 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main Switch	:	1 x 200 A Triple pole 10 kA switch disconnecter
Socket Outlets	:	3 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 12 x 20 A Single pole 6 kA mcb's
Dedicated Plugs	:	6 x 20 A Single pole mcb's
Mess Hall Air Conditioners	:	2 x 63 A Triple pole 6 kA mcb's
Telecom Operator Air Conditioner :		1 x 20 A Single pole 6 kA mcb
Board Room Air Conditioners	:	2 x 63 A Single pole 6 kA mcb's
Board Room Air Conditioners	:	2 x 20 A Single pole 6 kA mcb's
Main Hall Air Conditioners	:	3 x 63 A Triple pole 6 kA mcb's
Main Hall Air Conditioner	:	1 x 20 A Triple pole 6 kAmcb
Mess Hall Air Conditioners	:	3 x 63 A Triple pole 6 kA mcb's
Mess Hall Air Conditioners	:	2 x 20 A Single pole 6 kA mcb's
Hydroboil	:	1 x 32 A Single pole 6 kA mcb
Toaster	:	1 x 20 A Single pole 6 kA mcb
Bains Marie	:	2 x 40 A Double pole 6 kA mcb's
Lighting Controls	:	2 x L5512RVF 12 x 10 A Relay units, c/w 200 mA Power Supply
Power Supply to Controllers	:	4 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	4 x 20 A Single pole 6 kA mcb's
Emergency Lights	:	3 x 10 A Single pole 6 kA mcb's
Lights	:	9 x 10 A Single pole 6 kA mcb's
External Lights Board Room	:	1 x 10 A Single pole 6 kA mcb
External Lights Halls	:	1 x 10 A Single pole 6 kA mcb
Swimming Pool	:	1 x 20 A Single pole 6 kA mcb

22.07 BLOCK A (GROUND FLOOR) DISTRIBUTION BOARD : DB-G2

<u>PANEL - 1</u>	:	<u>STANDBY POWER (SIGNAL RED COVER PLATE)</u>
Main Switch	:	1 x 150 A Triple pole 20 kA switch disconnecter
DB-G2_1 (Block A First Floor Distribution Board)	:	1 x 80 A Triple pole 10 kA mcb
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 8 x 20 A Single pole 6 kA mcb's
Heat Pumps (Geysers)	:	2 x 20 A Triple pole 6 kA mcb's
Hot Water Cylinders	:	6 x 20 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Exhaust Fans	:	3 x 5 A Single pole 6 kA mcb's
External lights	:	1 x 10 A Single pole 6 kA mcb
Emergency lights	:	2 x 10 A Single pole 6 kA mcb's
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's
Toilet Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Control	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Storeroom Lights	:	1 x 10 A Single pole mcb
Lobby Lights	:	3 x 10 A Single pole 6 kA mcb's
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Stair Lights	:	1 x 10 A Single pole 6 kA mcb
Guest Toilet Lights	:	2 x 10 A Single pole 6 kA mcb

PANEL - 2 : NORMAL POWER (ORANGE COVER PLATE)
(Fed from Mini-sub THLB_5)

Main switch	:	1 x 80 A Triple pole 6 kA switch disconnecter
DB-G2_1_Normal	:	1 x 63 A Triple pole 6 kA mcb
Heater circuits	:	8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	5 x 10 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's
Hand Driers	:	2 x 20 A Single pole 6 kA mcb's

22.08 BLOCK A (FIRST FLOOR) DISTRIBUTION BOARD : DB-G2 1

PANEL 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main Switch	:	1 x 100 A Triple pole 10 kA switch disconnecter
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 8 x 20 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
TV Area Lights	:	1 x 10 A Single pole 6 kA mcb
Toilet Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Control	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Storeroom Lights	:	1 x 10 A Single pole 6 kA mcb
Foyer Lights	:	1 x 10 A Single pole 6 kA mcb

PANEL 2 : NORMAL POWER (ORANGE COVER PLATE)

(Fed from Panel – 2 DB-G2)

Main Switch	:	1 x 63 A Triple pole 6 kA switch disconnecter
Heater circuits	:	8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	5 x 10 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

22.09 BLOCK B (GROUND FLOOR) DISTRIBUTION BOARD : DB-G3

PANEL – 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main Switch	:	1 x 160 A Triple pole 20 kA switch disconnecter
DB-G3_1 (Block B First Floor Distribution Board)	:	1 x 100 A Triple pole 10 kA mcb
Dedicated Socket Outlets	:	4 x 20 A Single pole 6 kA mcb's
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	1 x 10 A Single pole 6 kA mcb
Extractor Fans	:	2 x 10 A Single pole 6 kA mcb's
Server Room Air Conditioners	:	2 x 20 A Single pole 6 kA mcb's
Server Cabinet	:	1 x 30 A Triple pole 6 kA mcb
Lighting Controls	:	3 x L5512RVF 12 x 10 A Relay units, c/w 200 mA Power Supply
Power Supply to Controllers	:	6 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	6 x 20 A Single pole 6 kA mcb's
Office Lighting	:	14 x 10 A Single pole 6 kA mcb's
External Lights	:	2 x 10 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Server Room Lights	:	1 x 10 A Single pole 6 kA mcb
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	4 x 5 A Single pole 6 kA mcb's
Stair Lights	:	1 x 10 A Single pole 6 kA mcb
Foyer Lights	:	3 x 10 A Single pole 6 kA mcb's
Swimming Pool Pump and Lights :		1 x 10 A Single pole 6 kA mcb
Lighting Control	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Printing Room Lights	:	1 x 10 A Single pole 6 kA mcb
Guest Toilet Lights	:	2 x 10 A Single pole 6 kA mcb's
Female and Male Toilet Lights	:	2 x 10 A Single pole 6 kA mcb's

**PANEL 2 : NORMAL POWER (ORANGE COVER PLATE)
(Fed from Mini-sub THLB_5)**

Main Switch	:	1 x 80 A Triple pole 6 kA switch disconnecter
DB-G3_1_Normal	:	1 x 63 A Triple pole 6 kA mcb
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Hand Driers	:	6 x 20 A Single pole 6 kA mcb's

22.10 BLOCK B (FIRST FLOOR) DISTRIBUTION BOARD : DB-G3 1

PANEL 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main Switch	:	1 x 100 A Triple pole 10 kA switch disconnecter
Dedicate Socket Outlets	:	4 x 20 A Single pole 6 kA mcb's
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	1 x 10 A Single pole 6 kA mcb
Server Room Air Conditioners	:	2 x 20 A Single pole 6 kA mcb's
Server Cabinet	:	1 x 30 A Triple pole 6 kA mcb
Lighting Controls	:	2 x L5512RVF 12 x 10 A Relay units, c/w 200 mA Power Supply
Power Supply to Controllers	:	4 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	4 x 20 A Single pole 6 kA mcb's
Office Lighting Circuits	:	15 x 10 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb
Server Room Lights	:	1 x 10 A Single pole 6 kA mcb
Printing Room Lights	:	1 x 10 A Single pole 6 kA mcb
Female and Male Ablutions Lights :	:	2 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	2 x 5 A Single pole 6 kA mcb's
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's

PANEL 2 : NORMAL POWER (ORANGE COVER PLATE)
(Fed from Panel – 2 DB-G3)

Main Switch	:	1 x 63 A Triple pole 6 kA switch disconnecter
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Hand Driers	:	4 x 20 A Single pole 6 kA mcb's

22.11 KITCHEN DISTRIBUTION BOARD : DB-K

PANEL – 1 : NORMAL POWER (ORANGE COVER PLATE)

Main switch	:	1 x 150 A Triple pole 20 kA switch disconnecter
Socket outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 12 x 20 A Single pole 6 kA mcb's
Oil Jacketed Boiling Pan #2	:	1 x 40 A Triple pole 6 kA mcb
Tilting Pan #2	:	1 x 63 A Triple pole 10 kA mcb
3 Plate Electric Stove	:	1 x 63 A Triple pole 6 kA mcb
Convection Oven	:	1 x 63 A Triple pole 6 kA mcb
Deep Fryer	:	1 x 80 A Triple pole 6 kA mcb
Dish Washer	:	1 x 32 A Triple pole 6 kA mcb
Food Mixer	:	1 x 10 A Triple pole 6 kA mcb
Meat Slicer	:	1 x 10 A Single pole 6 kA mcb
Meat Saw	:	1 x 10 A Triple pole 6 kA mcb
Vegetable Preparation Machine	:	1 x 10 A Single pole 6 kA mcb
Potato Peeler	:	1 x 10 A Single pole 6 kA mcb
Microwave Oven	:	1 x 10 A Single pole 6 kA mcb
Bread Slicer	:	1 x 10 A Single pole 6 kA mcb
Heat Pumps	:	2 x 30 A Single pole 6 kA mcb
Hot Water Cylinders	:	2 x 30 A Single pole 6 kA mcb's
Lighting Controls	:	2 x L5512P/VF 12 x 10 A Relay units, c/w 200 mA Power Supply
Power Supply to Controllers	:	4 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	4 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	6 x 10 A Single pole 6 kA mcb's
Office Lights	:	1 x 10 A Single pole 6 kA mcb
Office Extractor Fan	:	1 x 5 A Single pole 6 kA mcb
K1-3 Storage Lights	:	1 x 10 A Single pole 6 kA mcb
K1-3 Storage Extractor Fan	:	1 x 5 A Single pole 6 kA mcb
K1-4 Storage Lights	:	1 x 10 A Single pole 6 kA mcb
K1-4 Storage Extractor Fan	:	1 x 5 A Single pole 6 kA mcb
K1-6 Storage Lights	:	1 x 10 A Single pole 6 kA mcb
K1-6 Storage Extractor Fan	:	1 x 5 A Single pole 6 kA mcb
Ablutions Lights	:	2 x 10 A Single pole 6 kA mcb's
Ablutions Extractor Fans	:	2 x 5 A Single pole 6 kA mcb
Emergency Lights	:	1 x 10 A Single pole 6 kA mcb
External Lights	:	1 x 10 A Single pole 6 kA mcb
Office Air Conditioners	:	2 x 20 A Single pole 6 kA mcb's

<u>PANEL – 2</u>	:	<u>STANDBY POWER (SIGNAL RED COVER PLATE)</u>
Main Switch	:	1 x 150 A Triple pole 20 kA switch disconnecter
Socket Outlets	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 6 x 20 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Extraction Canopy Lights	:	2 x 10 A Single pole 6 kA mcb's
Kitchen Lighting Circuits	:	3 x 10 A Single pole 6 kA mcb's
External Lights	:	2 x 10 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Exhaust Fans Fan control	:	2 x 5 A Single pole 6 kA mcb's
Island Extraction Canopy	:	1 x 63 A Triple pole 6 kA mcb
Wall Mounted Extraction Canopy :		1 x 63 A Triple pole 6 kA mcb
Bell	:	1 x 5 A Single pole 6 kA mcb
Oil Jacketed Boiling Pot #1	:	1 x 40 A Triple pole 6 kA mcb
Cold Room	:	1 x 30 A Triple pole 6 kA mcb
Cold Room Blower Unit	:	1 x 20 A Single pole 6 kA mcb
Freezer Room	:	1 x 63 A Triple pole 6 kA mcb
Freezer Room Blower Unit	:	1 x 20 A Single pole 6 kA mcb
Tilting Pan #1	:	1 x 63 A Triple pole 10 kA mcb

23.01 MINIATURE SUBSTATION THLB 6

PANEL – 1 : NORMAL POWER

Main switch	:	1 x 600 A Triple pole 35 kA switch disconnecter
Generator_2	:	1 x 450 A Triple pole 20 kA mcb
DB-W_Normal_Power	:	1 x 80 A Triple pole 10 kA mcb
DB-H_Normal_Power	:	1 x 80 A Triple pole 10 kA mcb
DB-N_Normal_Power	:	1 x 100 A Triple pole 10 kA mcb
DB-E_Normal Power	:	1 x 80 A Triple pole 10 kA mcb

23.02 STANDBY GENERATOR 2

PANEL - 1 : STANDBY POWER

Main Switch	:	1 x 450 A Triple pole 20 kA switch disconnecter
Library DB (DB-G)	:	1 x 100 A Triple pole 20 kA mcb
DB-E<E> (Block F Ground Floor) :		1 x 200 A Triple pole 20 kA mcb
DB-H<E> (Block D Ground Floor):		1 x 150 A Triple pole 20 kA mcb
DB-N<E> (Block E Ground Floor):		1 x 200 A Triple pole 20 kA mcb
DB-W<E> (Block C Ground Floor) :		1 x 150 A Triple pole 20 kA mcb

23.03 LIBRARY DISTRIBUTION BOARD : DB-G<E> (SIGNAL RED COVER PLATE)

PANEL – 1 : STANDBY POWER

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Sub Distribution Board (DB-GA<E>) :		1 x 100 A Single pole 20kA mcb
Dedicated Socket Outlets	:	8 x 20 A Single pole 6 kA mcb's

23.04 LIBRARY SUB- DISTRIBUTION BOARD : DB-GA

PANEL – 1 : STANDBY POWER

Main switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Socket outlets	:	3 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 12 x 20 A Single pole 6 kA mcb's
Air Conditioners	:	3 x 30 A Triple pole 6 kA mcb's
Air Extractor Fan	:	1 x 30 A Triple pole 6 kA mcb
Air Conditioners	:	2 x 30 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
External Lights	:	1 x 10 A Single pole 6 kA mcb
Emergency Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Control	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Library Lighting Circuits	:	2 x 10 A Single pole 6 kA mcb's
Dimmer Lights	:	2 x 10 A Single pole 6 kA mcb's
Office Lights	:	1 x 10 A Single pole 6 kA mcb
Passage Lights	:	1 x 10 A Single pole 6 kA mcb

23.05 BLOCK C (GROUND FLOOR) DISTRIBUTION BOARD : DB-W

PANEL – 1 : STANDBY POWER (SIGNAL RED COVER PLATE)

Main Switch	:	1 x 160 A Triple pole 20 kA switch disconnecter
DB-W_1 (Block C First Floor Distribution Board	:	1 x 100 A Triple pole 20 kA mcb
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 8 x 20 A Single pole 6 kA mcb's
Heat Pumps #1 & #2	:	2 x 20 A Triple pole 6 kA mcb's
Heat Pump #3	:	1 x 30 A Single pole 6 kA mcb
Hot Water Cylinders	:	7 x 20 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's

Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
External Lights	:	2 x 10 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Stair Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Paraplegic Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's

PANEL 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Mini-sub THLB_6)

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
DB-W_1_Normal_Power	:	1 x 80 A Triple pole 20 kA mcb
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	5 x 10 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

23.06 BLOCK C (FIRST FLOOR) DISTRIBUTION BOARD : **DB-W_1**

PANEL 1 : **STANDBY POWER (SIGNAL RED COVER PLATE)**

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	4 x 10 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Foyer Lights	:	1 x 10 A Single pole 6 kA mcb

Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Storeroom Lights	:	2 x 10 A Single pole 6 kA mcb's
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's
Laundry Lights	:	1 x 10 A Single pole 6 kA mcb
Isolators 1 & 2	:	2 x 20 A Single pole 6 kA mcb's
Isolators 3 & 4	:	2 x 20 A Triple pole 6 kA mcb's
Isolator 5	:	1 x 20 A Double pole 6 kA mcb

PANEL 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Panel – 2 DB-W)

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	5 x 10 A Single pole 6 kA mcb's

23.07 BLOCK D (GROUND FLOOR) DISTRIBUTION BOARD : **DB-H**

PANEL - 1 : **STANDBY POWER (SIGNAL RED COVER PLATE)**

Main Switch	:	1 x 160 A Triple pole 20 kA switch disconnecter
DB-H_1 (Block D First Floor Distribution Board)	:	1 x 80 A Triple pole 20 kA mcb
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	8 x 10 A Single pole 6 kA mcb's
Heat Pumps	:	2 x 63 A Triple pole 6 kA mcb's
Hot Water Cylinders	:	6 x 20 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
External Lights	:	2 x 10 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's

Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Storeroom lights	:	1 x 10 A Single pole 6 kA mcb
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb

PANEL - 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Mini-sub THLB_6)

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
DB-H_1_Normal_Power	:	1 x 80 A Triple pole 20 kA mcb
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

23.08 BLOCK D (FIRST FLOOR) DISTRIBUTION BOARD : **DB-H 1**

PANEL 1 : **STANDBY POWER (SIGNAL RED COVER PLATE)**

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	8 x 10 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Stair Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Storeroom Lights	:	1 x 10 A Single pole 6 kA mcb
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb
Passage Lights	:	2 x 10 A Single pole 6 kA mcb

PANEL 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Panel – 2 DB-H)

Main switch	:	1 x 80 A Triple pole 20 kA switch disconnecter
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

23.09 BLOCK E (GROUND FLOOR) DISTRIBUTION BOARD : DB-N

PANEL – 1 : **STANDBY POWER (SIGNAL RED COVER PLATE)**

Main Switch	:	1 x 200 A Triple pole 20 kA switch disconnecter
DB-N_1 (Block E First Floor		
Distribution Board	:	1 x 100 A Triple pole 20 kA mcb
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	4 x 10 A Single pole 6 kA mcb's
Heat Pumps	:	2 x 63 A Triple pole 6 kA mcb's
Hot Water Cylinders	:	6 x 20 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512PVE 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
External Lights	:	2 x 10 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's
Stair Lights	:	2 x 10 A Single pole 6 kA mcb
Foyer Lights	:	1 x 10 A Single pole 6 kA mcb
Guest Toilet Lights	:	2 x 10 A Single pole 6 kA mcb's
Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Storeroom Lights	:	1 x 10 A Single pole 6 kA mcb
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb

PANEL 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Mini-sub THLB_6)

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
DB-N_1_Normal_Power	:	1 x 80 A Triple pole 20 kA mcb
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

23.10 BLOCK E (FIRST FLOOR) DISTRIBUTION BOARD : **DB-N_1**

PANEL 1 : **STANDBY POWER (RED COVER PLATE)**

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Socket outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	8 x 10 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's
Lobby Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Storeroom Lights	:	1 x 10 A Single pole 6 kA mcb
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Bar Area Lights	:	1 x 10 A Single pole 6 kA mcb
Darts Room Lights	:	1 x 10 A Single pole 6 kA mcb
Equipment	:	6 x 20 A Single pole 6 kA mcb's

PANEL 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Panel – 2 DB-N)

Main Switch	:	1 x 80 A Triple pole 20 kA switch disconnecter
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

23.11 BLOCK F (GROUND FLOOR) DISTRIBUTION BOARD : DB-E

PANEL – 1 : **STANDBY POWER (SIGNAL RED COVER PLATE)**

Main Switch	:	1 x 200 A Triple pole 20 kA switch disconnecter
DB-E_1 (Block F First Floor		
Distribution Board	:	1 x 80 A Triple pole 20 kA mcb
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	8 x 10 A Single pole 6 kA mcb's
Heat Pumps	:	2 x 63 A Triple pole 6 kA mcb's
Hot Water Cylinders	:	6 x 20 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512PVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
External Lights	:	1 x 10 A Single pole 6 kA mcb
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Stair Lights	:	1 x 10 A Single pole 6 kA mcb
Passage Lights	:	2 x 10 A Single pole 6 kA mcb's
Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Storeroom Lights	:	1 x 10 A Single pole 6 kA mcb
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb

PANEL 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Mini-sub THLB_6)

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
DB-E_1_Normal_Power	:	1 x 80 A Triple pole 20 kA mcb
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

23.12 BLOCK F (FIRST FLOOR) DISTRIBUTION BOARD : **DB-E 1**

PANEL 1 : **STANDBY POWER (RED COVER PLATE)**

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Socket Outlets	:	2 x 63 A Double pole single phase 6 kA, 30 mA earth leakage units and 8 x 20 A Single pole 6 kA mcb's
Shaving Plugs	:	8 x 10 A Single pole 6 kA mcb's
Lighting Controls	:	1 x L5512RVF 12 x 10 A Relay unit, c/w 200 mA Power Supply
Power Supply to Controllers	:	2 x 1 A Single pole 6 kA mcb's
Power Supply to Relays	:	2 x 20 A Single pole 6 kA mcb's
Lighting Circuits	:	5 x 10 A Single pole 6 kA mcb's
Emergency Lights	:	2 x 10 A Single pole 6 kA mcb's
Passage Lights	:	2 x 10 A Single pole 6 kA mcb
Stair Lights	:	1 x 10 A Single pole 6 kA mcb
Lighting Controls	:	1 x 24 hr Electronic Timer for Lighting Circuits below:
Extractor Fans	:	3 x 5 A Single pole 6 kA mcb's
Storeroom Lights	:	1 x 10 A Single pole 6 kA mcb
Bathroom Lights	:	1 x 10 A Single pole 6 kA mcb
Shower Room Lights	:	1 x 10 A Single pole 6 kA mcb

PANEL 2 : **NORMAL POWER (ORANGE COVER PLATE)**
(Fed from Panel – 2 DB-N)

Main Switch	:	1 x 100 A Triple pole 20 kA switch disconnecter
Heaters	:	8 x 20 A Single pole 6 kA mcb's
Under Counter Water Heaters	:	1 x 63 A Double pole single phase 6 kA, 30 mA earth leakage unit and 7 x 20 A Single pole 6 kA mcb's

ADDITIONAL REQUIREMENTS OR SPECIFICATIONS NOT COVERED IN QUALITY SPECIFICATIONS ABOVE

LED LIGHTS

All Light fittings installed for this project is to be of the LED type, unless otherwise stated.

The following international standard specifications and South-African Bureau of Standards shall apply to the LED luminaire specification:

SANS 475	Luminaires for interior lighting, street lighting and floodlighting – Performance and requirements
SANS 10114-1	Interior lighting part 1: Artificial lighting of interiors
SANS 10114-2	Interior lighting part 2: Emergency lighting
SANS 60598-1	Luminaires part 1: General requirements and tests
SANS 60598-2.1	Luminaires part 2: Particular requirements section 1 – Fixed general purpose luminaires.
SANS 60598-2.2	Luminaires part 2: Particular requirements section 2 – Recessed luminaires.
SANS 60598-2.3	Luminaires part 2: Particular requirements section 3 – Luminaires for road and street lighting.
SANS 60598-2.5	Luminaires part 2: Particular requirements section 5 – Flood lighting.
SANS 61347-1 to 13	Lamp control gear
SANS 62031	LED modules for general lighting – Safety specifications
SANS 62384	DC or AC supplied electronic control gear for LED modules – Performance requirements.
SANS 62560	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Safety specification.
SANS 62612	Self-ballasted LED lamps for general lighting services with supply voltages > 50V – Performance requirements
EN 55015	Limits and methods of measurement of radio disturbance of electrical lighting or equipment.
EN 61000-3.2	Electromagnetic compatibility (EMC) limits for harmonic current emissions.
EN 61000-3.3	Electromagnetic compatibility (EMC) limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.
EN 61547	Equipment for general lighting purposes: EMC immunity requirements.
IEC-EN 62471	Photo biological safety of lamps and lamp systems for LEDs
IES LM-79-08	Approved method: Electrical and photometric measurement of solid-state lighting products.
IES LM-80	Approved method: Measuring lumen maintenance of LED light sources.

General requirements:

The luminaire shall be suitable for operation with mid-power LEDs. **Note that no LED tubes are allowed to be used.**

The luminaire shall be suitable for operation on a 230 V single phase 50 Hz mains supply.

Power factor capacitors shall be supplied to correct the power factor to at least 0.95 or higher.

The luminaire shall be marked with identification labels stating the brand name and model and shall bear the SABS approval mark.

The driver shall comply with IEC 61347-1 and IEC 61347-2B as applicable and shall be suitable for operation on 230 V $\pm 10\%$, 50 Hz single phase system and it must be insured that harmonics filter is provided as per SANS 61000-3-2. The drivers and LED circuitry shall be protected against lighting and power surges. Suitable surge arrestors with a 10 kA rating shall be provided for indoor installations and 20 kA for outdoor installations.

Colour rendering (Ra) shall be not less than 80 and lumen depreciation of not more than 30% L70 at 50 000 hours @ T_a 25 °C. Colour temperature of the LED lamp shall be 4000K, unless otherwise stated.

Thermal requirements:

The luminaire must be able to withstand an ambient temperature of 35 °C. Storage temperature of this luminaire should be able to handle $-40\text{ °C} < T < 60\text{ °C}$.

To this end internal electrical and mechanical components shall not be allowed to exceed their maximum temperature ratings of 75 °C. Test reports from an independent authorised testing facility proving this requirement shall be made available on request.

Noise requirements:

The noise level emitted from the luminaire shall be kept as low as possible. Drivers/electronic components shall therefore fully comply with the latest edition of EN 55015.

= END OF SPECIFICATION =

PART 4: BILLS OF QUANTITIES

Electrical, mechanical and/or any other engineering work must be measured by the quantity surveyor and must be prepared in accordance with the latest edition of the Standard System of Measuring Building Work.

No additional provision for Preliminaries may be included in the engineering sections of the bills of quantities.

Bills of Quantities are included in part C2.2 of the tender document.

PART 5: ELECTRICAL WORK MATERIAL SCHEDULE

The Contractor shall complete the following schedules and submit them to the Electrical Engineer within 21 days of the date of the acceptance of the tender.

The schedules will be scrutinised by the Electrical Engineer and should any material offered not comply with the requirements contained in the specification, the Contractor will be required to supply material in accordance with the contract at no additional cost.

NB: Only one manufacturer's name to be inserted for each item.

Item	Material	Make or trade name	Country of origin
1.	Distribution boards		
2.	Circuit breakers 1P, 2P, 3P		
3.	On load isolators without trips		
4.	Contactors 1P, 2P, 3P		
5.	Earth leakage relays 1 & 3 phase		
6.	H.R.C. fuse switches		
7.	Kilowatt hour meter		
8.	Current transformers		
9.	Voltmeter		
10.	Maximum demand ammeter		
11.	Daylight sensitive switch		
12.	Time switch		
13.	Conduit		
14.	Conduit boxes		
15.	Power skirting		
16.	Surface switches		
17.	Watertight switches		
18.	16 A flush socket outlets		
19.	16 A surface socket outlets		
20.	16 A watertight socket outlets		
21.	Fluorescent luminaires		
22.	Type A		
	Type B		
	Type C		
	Type D		
	Etc.		
23.	Bulkhead fittings: Type F		
24.	Spherical fittings: Type G		
25.	4 plate stove		
26.	Convection heater		
27.	Fan heater		
28.	Fans		
29.	Clocks		
30.	PVCA cable		
31.	Cable trays		

PARTICULARS OF ELECTRICAL CONTRACTOR

Note to consultants

Please ensure that DPW -22(EC) Particulars of electrical contractor is inserted in main tender document.

PART 6: DRAWINGS

▪ List of Drawings

- The following drawing numbers have been allocated:
- Site Plan / Location Plan:
 - E-01 Site Plan
- Power Layout (Main Supply)
 - On Site Plan
- Site Lighting:
 - E-02 Site Lighting Layout
- Generator Details
 - E-03 Typical Generator Foundation
 - E-04 Typical Generator Earthing
- Small Power Layout, Sockets, Isolators
 - E-04a - Block A, B: Ground Floor Power Layout
 - E-05a - Block A, B: First Floor Power Layout
 - E-07a - Block C, D: Ground Floor Power Layout
 - E-08a - Block C, D: First Floor Power Layout
 - E-10a - Block E, F, G: Ground Floor Power Layout
 - E-11a - Block E, F: First Floor Power Layout
 - E-14a - Halls, Boardroom and Kitchen: Power Layout
 - E-15a - Entrance to Site: Power Layout
- Power Skirting / Wire Way Layout
 - E-04b - Block A, B: Ground Floor: Power Skirting Layout
 - E-05b - Block A, B: First Floor: Power Skirting Layout
 - E-07b - Block C, D: Ground Floor: Power Skirting Layout
 - E-08b - Block C, D: First Floor: Power Skirting Layout
 - E-10b - Block E, F, G: Ground Floor: Power Skirting Layout
 - E-11b - Block E, F: First Floor: Power Skirting Layout
 - E-14b - Halls, Boardroom and Kitchen: Power Skirting Layout
 - E-15b - Entrance to Site: Power Skirting Layout

- Lighting Layout
 - E-04c - Block A, B: Ground Floor Lighting
 - E-05c - Block A, B: First Floor Lighting
 - E-07c - Block C, D: Ground Floor Lighting
 - E-08c - Block C, D: First Floor Lighting
 - E-10c - Block E, F, G: Ground Floor Lighting
 - E-11c - Block E, F: First Floor Lighting
 - E-14c - Halls, Boardroom and Kitchen Lighting
 - E-15c - Entrance to Site Lighting

- Lightning Protection Layout
 - E-02d - Site: Lightning Protection Layout
 - E-06d - Block A, B: Roof: Lightning Protection Layout
 - E-09d - Block C, D: Roof: Lightning Protection Layout
 - E-12d - Block E, F, G: Roof: Lightning Protection Layout
 - E-14d - Halls, Boardroom and Kitchen: Roof: Lightning Protection Layout
 - E-15d - Entrance to Site Power: Roof: Lightning Protection Layout

- Single Line Diagram
 - E-01e_01 - Single Line Diagram – Main Lines
 - E-01e_02 - Single Line Diagram – DB-PH (Pump House)
 - E-01e_03 - Single Line Diagram – DB-PA (Parking Area)
 - E-02e - Single Line Diagram – DB-G1 (Halls)
 - E-04e_01 - Single Line Diagram – DB-G2 (Block A Ground Floor)
 - E-04e_02 - Single Line Diagram – DB-G3 (Block B Ground Floor)
 - E-05e_01 - Single Line Diagram – DB-G2_1 (Block A First Floor)
 - E-05e_02 - Single Line Diagram – DB-G3_2 (Block B First Floor)
 - E-07e_01 - Single Line Diagram – DB-W (Block C Ground Floor)
 - E-07e_02 - Single Line Diagram – DB-H (Block D Ground Floor)
 - E-08e_01 - Single Line Diagram – DB-W_1 (Block C First Floor)
 - E-08e_02 - Single Line Diagram – DB-H_1 (Block D First Floor)

- E-10e_01 - Single Line Diagram – DB-N (Block E Ground Floor)
- E-10e_02 - Single Line Diagram – DB-E (Block F Ground Floor)
- E-10e_03 - Single Line Diagram – DB-G (Library)
- E-11e_01 - Single Line Diagram – DB-N (Block E First Floor)
- E-11e_02 - Single Line Diagram – DB-E (Block F First Floor)
- E-14e - Single Line Diagram – DB-K (Kitchen)
- E-15e - Single Line Diagram – DB-GH (Gate House)

○ Smoke Detection Layout

- E-04f - Block A, B: Ground Floor: Smoke Detection
- E-05f - Block A, B: First Floor: Smoke Detection
- E-07f - Block C, D: Ground Floor: Smoke Detection
- E-08f - Block C, D: First Floor: Smoke Detection
- E-10f - Block E, F, G: Ground Floor: Smoke Detection
- E-11f - Block E, F: First Floor: Smoke Detection
- E-14f - Halls, Boardroom, Kitchen: Smoke Detection
- E-15f - Entrance Gate: Smoke Detection

GENERATOR SPECIFICATIONS



**public works
& infrastructure**

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

NATIONAL DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE

ELECTRICAL ENGINEERING SERVICES

**SPECIFICATION FOR THE SUPPLY, INSTALLATION AND COMMISSIONING OF
OUTDOOR EMERGENCY GENERATOR SETS AT THABONG (WELKOM) SAPS
TRAINING FACILITY**

SEPTEMBER 2025

Table of Contents

1.	SECTION 1 – GENERAL	134
1.1.	Intent of Specification	134
1.2.	Standards and Codes	134
1.3.	Compliance with Regulations	134
1.4.	Scope of Work	135
1.5.	Co-ordinating	135
1.6.	Tests Certificates and Inspections	135
1.7.	Operating and Maintenance Manuals	136
1.8.	Guarantee	136
1.9.	Materials and Workmanship	137
1.10.	Brochures	138
2.	SECTION 2 – EQUIPMENT REQUIREMENTS	140
2.1.	Engine	140
2.1.1.	General	140
2.1.2.	Rating	140
2.1.3.	De-Rating	140
2.1.4.	Starting and Stopping	140
2.1.5.	Starter Battery	141
2.1.6.	Cooling	141
2.1.7.	Lubrication	141
2.1.8.	Fuel Pump	141
2.1.9.	Fuel Tank	142
2.1.10.	Governor	143
2.1.11.	Flywheel	143
2.1.12.	Exhaust Silencer	143
2.1.13.	Accessories	144
2.1.14.	Exhaust emissions	144
2.2.	Alternator	144
2.2.1.	General	144
2.2.2.	Regulation	144
2.2.3.	Performance	145
2.2.4.	Coupling	145
2.3.	Switchboard	145
2.3.1.	General	145
2.3.2.	Construction	145
2.3.3.	Protection and Alarm Devices	146
2.3.4.	Modular Generator Set controller	148
2.3.5.	Manual Starting	152
2.3.6.	Battery Charging Equipment	153
2.3.7.	Switchboard Instruments	153
2.3.8.	Marking	154
2.3.9.	Earthing	154
2.3.10.	Operation Selector Switch	154
2.3.11.	Automatic Change-over System	154
2.3.12.	By-pass Switch and Main Isolator	155
2.3.13.	Start Delay	155
2.3.14.	Stop Delay	155
2.4.	Installation	155
2.5.	Warning Notices	156
2.6.	Construction	156
2.7.	Operation	156
3.	SECTION 3 – TECHNICAL SPECIFICATION	159
3.1.	General	159
3.2.	Site Information and Conditions	159
3.2.1.	Location	159

3.2.2.	Site Conditions.....	160
3.3.	Output and Voltage.....	160
3.4.	Switchboard/Control Panel Unit.....	160
3.5.	Cables.....	161
3.6.	Engine.....	161
3.7.	Alternator.....	161
3.8.	Load Acceptance.....	162
3.9.	Enclosure.....	162
3.10.	Alarms.....	163
3.11.	Remote Control Generator Switch.....	164
3.12.	Fuel Drip Tray.....	164
3.13.	Completion Time.....	165
3.14.	Inform.....	165
3.15.	Fuel Supply Tank.....	165
4.	SECTION 4 – SCHEDULES OF TECHNICAL INFORMATION	167
4.1.	Engine.....	167
4.2.	Alternator.....	169
4.3.	Switchboard.....	170
4.4.	Battery.....	171
4.5.	Dimensions.....	171
4.6.	Deviation from the Specification as an Alternative (State Briefly).....	171
4.7.	Spare Parts and Maintenance Facilities.....	172
5.	SECTION 5 – PRICE SCHEDULES	174
5.1.	General.....	174
5.2.	Schedule.....	174
5.3.	Summary of Schedules of Quantities.....	176

SECTION 1 – GENERAL

TABLE OF CONTENTS

1.1.	Intent of Specification.....	133
1.2.	Standards and Codes	133
1.3.	Compliance with Regulations	133
1.4.	Scope of Work.....	134
1.5.	Co-ordinating.....	134
1.6.	Tests Certificates and Inspections	134
1.7.	Operating and Maintenance Manuals	135
1.8.	Guarantee.....	135
1.9.	Materials and Workmanship	136
1.10.	Brochures	137

1. SECTION 1 – GENERAL

1.1. Intent of Specification

The specification is intended to cover the complete installation and commissioning of the generator plant. The minimum equipment requirements are outlined, but do not cover all the details of design and construction. Such details are recognised as being the exclusive responsibility of the contractor.

For the purposes of this document the following applies:

- Generator Contractor shall be referred to as the Generator Contractor or simply Contractor;
- The masculine includes the feminine;
- The singular includes the plural.

1.2. Standards and Codes

All standards referenced shall be the latest editions.

SANS 10142-1	The wiring of premises: Low Voltage Installations
SANS 8528	Reciprocating internal combustion engine driven alternating current generating sets.
SANS 60034	Rotating Electrical Machines
SANS IEC 60947	Low Voltage Switchgear
OHSACT	Occupational Health and Safety Act.
Department of Public Works Quality Specification Parts A, B and C.	
Local municipality by-laws for generator installations. (To be obtained from local municipality)	

1.3. Compliance with Regulations

The installation shall be erected and tested in accordance with the following Acts and regulations:

- a) The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended,
- b) The Local Government Ordinance 1939 (Ordinance 17 of 1939) as amended and the municipal by-laws and any special requirements of the local supply authority,
- c) The Fire Brigade services Act 1987 (Act 99 of 1987) as amended,
- d) The National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as amended,
- e) The Electricity Act 1987 (Act 41 of 1987) as amended.
- f) The environmental Act and regulations

1.4. Scope of Work

Included in this Outdoor Generator Specification

Supply, delivery, installation and commissioning of the complete outdoor emergency generator inside an IP65 canopy/container set on a concrete plinth as specified in this document.

The successful tenderer shall supply, deliver and install a complete single enclosed diesel driven standby generator set in a position that will be determined on site. The machine shall be totally enclosed in a 3CR12 stainless steel housing powder coated or within 50 km from the coast with grade 316 steel housing powder coated. The exhaust shall be manufactured from stainless steel.

The housing is to be provided on galvanized 3CR12 stainless steel skids so that the generator set can be transported to site and placed in position on a concrete plinth, casted by the successful tenderer. The skids must be of sufficient height to allow for the passage of storm water under the set.

1.5. Co-ordinating

The Contractor shall familiarise himself with the requirements of the other professional disciplines and shall examine the plans and specifications covering each of these sections.

The generator space, noise and vibration requirements shall be carefully checked with other professional disciplines to ensure that the equipment can be installed in the proper sequence in the space allotted.

1.6. Tests Certificates and Inspections

The following tests are to be carried out:

- a) At the supplier's premises, before the generating set will be delivered to site. Representatives of the Department must be present during the test to satisfy themselves that the generating set complies with the specification and delivers the specified output. The test must be carried out in accordance with SANS 8528. **The Representative / Agent must be timeously advised of the date for the test.**
- b) After completion of the works and before practical completion is taken, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installation will be inspected and the contractor shall make good, to the satisfaction of the Representative / Agent, any defects which may arise.
- c) The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installation at completion.
- d) Test reports of both tests as specified under (a) and (b) are to be submitted to the Representative / Agent.

The total costs for these tests shall be included in the tendered amount.

In the event of the plant, equipment or installation not passing the test, the Representative/Agent shall be at liberty to deduct from the Contract amount all reasonable expenses incurred by the Employer and/or the Representative/Agent attending the test.

1.7. Operating and Maintenance Manuals

The Contractor shall be responsible for the compilation of a complete set of Operating and Maintenance manuals.

This shall be done in accordance with Section 4 – Operating and Maintenance manuals.

All information shall be recorded and reproduced in electronic format as well as supplying the Representative/Agent with three sets of hard copies.

Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion of the installation.

1.8. Guarantee

After works completion of the installation have been achieved, there will follow a 12-month free maintenance period.

During this period the generator contractor shall maintain the generator installation as per the requirements of the Occupational Health and Safety Act. This maintenance shall include systematic examinations, adjustments and lubrication of all generator equipment. Electrical and mechanical parts shall be repaired or replaced whenever it is required to maintain optimum performance without additional cost to the Department, unless the condition was caused by misuse or vandalism of the generator equipment or natural hazards/force majeure.

The work under this section shall be performed by competent, qualified accredited personnel under the supervision and in the direct employment of the Generator Contractor and shall not be transferred to any non-affiliated agent. Contract maintenance and repair work shall be done during normal working hours and shall further provide emergency call-back service twenty-four (24) hours a day, seven (7) days a week.

During the guarantee/maintenance period the Department will invite tenders for the comprehensive maintenance of the generator, which will commence after the final completion has taken place, i.e. after the twelfth month guarantee period is over and all defects are corrected.

1.9. Materials and Workmanship

- a) The work throughout shall be executed to the highest standards and to the entire satisfaction of the Representative / Agent who shall interpret the meaning of the Contract Document and shall have the authority to reject any work and materials, which, in his judgement, are not in full accordance therewith. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Representative / Agent.
- b) All work shall be executed in a first-class manner by qualified accredited tradesman.
- c) The Contractor shall be fully responsible for his work and shall replace any of the work which may be damaged, lost or stolen. The Contractor shall protect the building and its contents against damage by him, his employees or sub-contractors and shall make good any damage thereto.
- d) The Contractor shall indemnify the Employer of all liability for damages arising from injuries or disabilities to persons or damage to property occasioned by any act or omission of the Contractor or any of his sub-contractors, including any and all expenses, legal or otherwise, which may be incurred by the Employer or Representative / Agent in the defence of any claim, action or suit.
- e) The Contractor shall warrant that the materials and workmanship shall be of the highest grade, that the equipment shall be installed in a practical and first-class manner in accordance with the best practices and ready and complete for full operation. It is specifically intended that all material or labour which is usually provided as part of such equipment as is called for and which is necessary for its proper completion and operation shall be provided without additional cost whether or not shown or described in the Contract Document.
- f) The Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation and commissioning work. The Contractor shall also be prepared to promptly furnish any information relating to his own work as may be necessary for the proper installation work and shall co-operate with and co-ordinate the work of others as may be applicable.
- g) The Contractor shall inspect and verify that the existing power feeder system is compatible with the equipment offered and any changes or upgrading of the electrical supply shall be brought to the attention of the Representative / Agent.
- h) Material and equipment damaged in transit shall be replaced with undamaged material without additional cost to the Department.
- i) All components and their respective adjustment, which do not form part of the equipment installation work, but influence the optimum and safe operation of the equipment shall be considered to form part of, and shall be included in the Contractor's scope of works.
- j) All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.

- k) The Contractor shall make sure that all safety regulations and measures and environmental regulations are applied and enforced during the installation and guarantee period to ensure the safety of the public and the User Client.

1.10. Brochures

Detailed brochures of all equipment offered shall be presented together with the tender documents.

SECTION 2 – EQUIPMENT REQUIREMENTS

TABLE OF CONTENTS

2.1.	Engine.....	139
2.1.1.	General	140
2.1.2.	Rating.....	140
2.1.3.	De-Rating	140
2.1.4.	Starting and Stopping	140
2.1.5.	Starter Battery.....	140
2.1.6.	Cooling.....	141
2.1.7.	Lubrication	141
2.1.8.	Fuel Pump	141
2.1.9.	Fuel Tank.....	142
2.1.10.	Governor.....	143
2.1.11.	Flywheel.....	143
2.1.12.	Exhaust Silencer	143
2.1.13.	Accessories	144
2.1.14.	Exhaust emissions	144
2.2.	Alternator	154
2.2.1.	General	144
2.2.2.	Regulation	144
2.2.3.	Performance.....	145
2.2.4.	Coupling	145
2.3.	Switchboard	145
2.3.1.	General	145
2.3.2.	Construction	145
2.3.3.	Protection and Alarm Devices	136
2.3.4.	Modular Generator Set controller	138
2.3.5.	Manual Starting.....	142
2.3.6.	Battery Charging Equipment.....	143
2.3.7.	Switchboard Instruments	143
2.3.8.	Marking	144
2.3.9.	Earthing	144
2.3.10.	Operation Selector Switch.....	144
2.3.11.	Automatic Change-over System.....	144
2.3.12.	By-pass Switch and Main Isolator	145
2.3.13.	Start Delay	145
2.3.14.	Stop Delay	145
2.4.	Installation	154
2.5.	Warning Notices	155
2.6.	Construction	155
2.7.	Operation.....	155

2. SECTION 2 – EQUIPMENT REQUIREMENTS

2.1. Engine

2.1.1. General

The engine must comply with the requirements laid down in SANS 8528 and must be of the atomized injection, compression ignition type, running at a speed not exceeding 1500 r.p.m. The engine must be amply rated for the required electrical output of the set, when running under the site conditions. The starting period for either manual or automatic switching-on until the taking over by the generating set, in one step, of a load equal to the specified site electrical output, shall not exceed 15 seconds. This must be guaranteed by the Tenderer.

Turbo-charged engines will only be accepted if the Tenderer submits a written guarantee that the engine can deliver full load within the specified starting period.

Curves furnished by the engine makers, showing the output of the engine offered against the speed, for both intermittent and continuous operation as well a fuel consumption curves when the engine is used for electric generation, must be submitted with the Tender.

2.1.2. Rating

The set shall be capable of delivering the specified output continuously under the site Conditions, without overheating. The engine shall be capable of delivering an output of 110% of the specified output for one hour in any period of 12 hours consecutive running in accordance with SANS 8528.

2.1.3. De-Rating

The engine must be de-rated for the site conditions as set out in the Technical Specification, Section 3 of this document.

The de-rating of the engine for site conditions shall be strictly in accordance with SANS 8528 as amended to date. Any other methods of de-rating must have the approval of the Department and must be motivated in detail. Such de-rating must be guaranteed in writing and proved by the successful Tenderer at the site test.

2.1.4. Starting and Stopping

The engine shall be fitted with an electric starter motor and be easily started from cold, without the use of any special ignition devices under summer as well as winter conditions.

Tenderers must state what arrangements are provided to ensure easy starting in cold weather. Full details of this equipment must be submitted. In the case of water cooled engines, any electrical heaters shall be thermostatically controlled. The electrical circuit for such heaters shall be taken from the control panel, and must be protected by a suitable circuit breaker.

2.1.5. Starter Battery

The set must be supplied with a fully charged, lead-acid type or maintenance free type battery, complete with necessary electrolyte. The battery must have sufficient capacity to provide the starting torque stipulated by the engine manufacturer. The battery capacity shall not be less than 120 Ah and shall be capable of providing three consecutive start attempts from cold and thereafter a fourth attempt under manual control of not less than 20 seconds duration each. The battery must be of the heavy duty "low maintenance" type, housed in a suitable battery box.

2.1.6. Cooling

The engine may be either of the air or water cooled type. In the case of water-cooling, a built-on heavy duty, tropical type pressurised radiator must be fitted. Only stand-by sets that are water cooled shall have electric heaters.

For either method of cooling, protection must be provided against running at excessive temperatures. The operation of this protective device must give a visual and audible indication on the switchboard. Water-cooled engines shall in addition be fitted with a low water cut-out switch, installed in the radiator, to switch the set off in the event of a loss of coolant. The protection shall operate in the same way as the other cut-outs (e.g. low oil pressure). All air ducts for the cooling of the engine are to be allowed for. The air shall be supplied from the cooling fan cowling/radiator face to air outlet louvers in the enclosure.

2.1.7. Lubrication

Lubrication of the main bearings and other important moving parts shall be by forced feed system. An automatic low oil pressure cut-out must be fitted, operating the stop solenoid on the engine and giving a visible and audible indication on the switchboard.

2.1.8. Fuel Pump

The fuel injection equipment is suitable for operation with the commercial brands of diesel fuel normally available in South Africa.

2.1.9. Fuel Tank

The fuel tank shall be an integral part of the base frame of the generator set. The tank shall have sufficient capacity for standby sets to run the engine on full load for a period of 24 hours.

The diesel fuel storage system / tank which will be provided with the standby generator installation must be fitted with a fuel filtration and water separation system (filter & separator) which is entirely separate from the fuel supply line and line filter to the engine. This filtration and water separation system must be dedicated to purifying the content of the storage system / tank by way of the cleaning processes which are applied while circulating the fuel through the filter & separator unit.

The filtration system must be able to handle diesel fuel of “high” and of “low” sulphur content for an indefinite period. The suction line of the system must be connected to the lowest part of the storage system / tank. The return line must be connected in the top section of the storage system / tank in such a position and in such a way that the flow of fuel within the storage system / tank between the fuel return point and the fuel suction point will induce scouring of the bottom of the system / tank to effectively capture sediment and water in the to be filtered fuel.

The filtration unit must filter the diesel fuel, removing suspended particles of effective diameters down to 5 micron. In addition, it must separate all water from the fuel and the fuel storage system and automatically dispose of / dump such water into an open, removable receptacle for disposal at the installation or in a suitable position outside the building. Separation of the fuel and water must be sufficiently effective that the discharged water will meet the standard required for it to be disposed of into a municipal drain and sewer system.

The filter and water separator unit must draw its power from the DC batteries used to power the relevant generator set. The circulating pump shall be provided with a controller programmed to switch the pump through not more than three complete on and off cycles of equal time (i.e. 50% on; 50% off) , per hour, with a deviation of not more than 10 % \pm . The pump must be capable of a duty cycle of not less than 60% running time. The flow rate through the circulating pump must be between 1 l/min and 1.25 l/min.

The filter cartridge of the filter and water separator unit must be replaceable, and, in normal operational conditions, not require replacement within periods shorter than three months. The replacement units must be readily available.

The filtration & separator system may be mounted against the wall of the plant room or on the inside of a container, which may house the installation as may be specified elsewhere in this document.

The tank shall be fitted with a suitable filter, a full height gauge glass, "low fuel level" alarm, giving an audible and visible signal on the switchboard as well as a low-low fuel level cut-out.

An electrically operated pump with sufficient length of oil resistant hose to reach 2 m beyond the door of the canopy/container, shall be supplied, for each set for filling the fuel tank/s from 200 litre drums.

The interconnection fuel piping shall consist of copper tubes and the connection to vibrating components shall be in flexible tubing with armoured covering.

The contractor shall allow for the supply and installation of a fuel shut off fusible link in the container. The fusible link shall shut off the fuel at a temperature of 130 degrees in an event of a fire in the self-contain enclosure. The fusible link shall be mounted above the engine and coupled to the shut off valve by means of a 2 mm stainless steel cable. The cable shall be installed to the shut off valve without any possibility of kinking the cable which may cause malfunctioning of the protection device.

2.1.10. Governor

The speed of the engine shall be controlled by a governor in accordance with ECM of SANS 8528 if not otherwise specified in the Detailed Specification.

The permanent speed variation between no load and full load shall not exceed 4.5% of the nominal engine speed and the temporary speed variation shall not exceed 10%. External facilities must be provided on the engine, to adjust the nominal speed setting by $\pm 5\%$ at all loads between zero and rated load.

2.1.11. Flywheel

A suitable flywheel must be fitted, so that lights fed from the set will be free from any visible flicker.

The cyclic irregularity of the set must be within the limit laid down in SANS 8528.

2.1.12. Exhaust Silencer

It is essential to keep the noise level as low as possible. An effective exhaust silencing system of the residential type must be provided and shall be capable of providing 20 to 30 decibels of suppression.

The exhaust system shall consist of 3CR12 steel for inland areas (further than 50 km from the coast) or Grade 304 stainless steel in coastal areas.

The exhaust pipe shall be installed in such a way that the expelled exhaust fumes will not cause discomfort to the public. The exhaust pipe must be flexibly connected to the engine to take up vibrations transmitted from the engine, which may cause breakage. The exhaust piping and silencer shall be lagged and then cladded in stainless steel sheet to reduce the heat and noise transmission in the generator enclosure and shall be protected against the ingress of driving rain at 45° to the horizontal. The exhaust pipe must extend 0,5 m above the canopy.

2.1.13. Accessories

The engine must be supplied complete with all accessories, air and oil filters, 3 instruction manuals, spare parts lists, the first fill of all lubricating oils, fuel, etc.

2.1.14. Exhaust emissions

The exhaust emissions shall comply with US Tier III/EU stage III standards.

2.2. Alternator

2.2.1. General

The alternator shall be of the self-excited brushless type, with enclosed ventilated drip-proof housing and must be capable of supplying the specified output continuously with a temperature rise not exceeding the limits laid down in SANS 60034-1 for rotor and stator windings.

The alternator shall be capable of delivering an output of 110% of the specified output, for one hour in any period of 12 hours consecutive running.

Both windings must be fully impregnated for tropical climate and must have an oil resisting finishing varnish.

2.2.2. Regulation

The alternator must preferably be self-regulated without the utilisation of solid state elements. The inherent voltage regulation must not exceed plus or minus 5% of the nominal voltage specified, at all loads with the power factor between unity and 0,9 lagging and within the driving speed variations of 4,5% between no-load and full load.

2.2.3. Performance

The excitation system shall be designed to promote rapid voltage recovery following the sudden application of the load. The voltage shall recover to within 5% of the steady state within 300 milliseconds following the application of full load and the transient voltage dip shall not exceed 18%.

2.2.4. Coupling

The engine and alternator must be directly coupled by means of a high quality flexible coupling, ISO 9001:2000 approved and must be designed and manufactured to this quality system.

2.3. Switchboard

2.3.1. General

A switchboard must be supplied and installed to incorporate the equipment for the control and protection of the generating set and battery charging.

The switchboard must conform the specification as set out in the following paragraphs.

2.3.2. Construction

The switchboard shall be enclosed in the steel enclosure.

All equipment, connections and terminals shall be easily accessible from the front. The front panels may be either hinged or removable and fixed with studs and chromium-plated cap nuts. Self-tapping screws shall not be used in the construction of the board.

All pushbuttons, pilot lights, control switches, instrument and control fuses, shall be mounted on hinged panels with the control wires in flexible looms.

The steelwork of the boards must be thoroughly de-rusted, primed with zinc chromate and finished with two coats of signal red quality enamel, or a baked powder epoxy coating.

Suitably rated terminals must be provided for all main circuits and the control and protection circuits. Where cable lugs are used, these shall be crimped onto the cable strands. Screw terminals shall be of the type to prevent spreading of cable strands. All terminals shall be clearly marked.

For the control wiring, each wire shall be fitted with a cable or wire marker of approved type, and numbering of these markers must be shown on the wiring diagram on the switchboard. Control wiring shall be run in PVC trunking. The trunking shall be properly fixed to the switchboard steelwork. Adhesives shall not be acceptable for the fixing of trunking or looms.

The modular generator set controller and protection equipment shall be mounted on a separate easily replaceable panel.

All equipment on the switchboard, such as contactors, isolators, busbars, etc., shall have ample current carrying capacity to handle at least 110% of the alternator full load current.

Access to the cubicle will be such that all components can be conveniently reached for testing and maintenance purposes.

The necessary bushes and a screen over the terminals will be provided where the power feeds enter and leave the cubicle.

The cubicle will be so constructed that the ac and dc components are screened from one another.

2.3.3. Protection and Alarm Devices

All switchboards shall be equipped with protection and alarm devices as described below.

A circuit breaker and an adjustable current limiting protection relay must be installed for protection of the alternator. The protection relay shall be of the type with inverse time characteristics. The relay shall cause contactor to isolate the alternator and stop the engine.

Protection must be provided for overload, high engine temperature, low lubricating oil pressure, over speed, start-failure, and low water level.

Reset push buttons are required on the modular generator set controller and a visible signal are required and the engine must stop when any of the protective devices operate. In the case of manual operation of standby sets, it shall not be possible to restart the engine.

The indication on the modular generator set controller must be in ENGLISH.

"OVERLOAD"

"TEMPERATURE HIGH"

"OIL PRESSURE LOW"

"OVERSPEED"

"START FAILURE"

"LOW WATER LEVEL"

In addition an audible and visible flashing signal shall be provided, when:

- a) The fuel level in the service tank is low. The indication on the modular generator set controller shall be "FUEL LOW".
- b) The battery charger failed. The indication on the modular generator set controller shall be "CHARGER FAIL"

A low-low level sensor must be provided. At this level the engine must stop to prevent air entering the fuel system.

This is also applicable to the engine driven generator/alternator.

All alarm conditions must operate an alarm hooter. A pushbutton must be installed in the hooter circuit to stop the audible signal, but the fault indicating light on the control panel must remain lit until the fault has been rectified.

An on/off switch is not acceptable. After the hooter has been stopped, it must be re-set automatically, ready for a further alarm.

The hooter must be of the continuous duty and low consumption type. Both hooter and protection circuits must operate from the battery.

Potential free contacts from the alarm relay must be brought down to terminals for remote indication of alarm conditions.

A test pushbutton must be provided to test all indicators lamps.

2.3.4. Modular Generator Set controller

The modular generator set controller shall be an electronic unit to match those of the other modular generator set controllers and of a high quality i.e. Levato, Deep Sea Electronics, Circom. It must be provided with IO and communication facilities.

The modular generator set controller will be supplied with all its functions and shall be mounted on a separate easily replaceable panel with plug in termination blocks for easy installation and replacement.

The modular generator set controller interface will be implemented with relays, contactors etc.

The modular generator set controller will have a mimic display of the alternator/mains/ change over contactors configuration with LED's showing the status of the mains, alternator and change over contactors.

Configuration software shall be supplied with the system. The software will be capable of the following:

- Fault management (event log)
- Configuration management (software upgrades and function changes)
- Account management (energy management)
- Performance management (generator set point changes)
- Security management (passwords)

The modular generator set controller will have a standard RS 232/485 or Ethernet interface suitable for TCP I/P transport medium. All communication including configuration management will be done through this port. Equipment connected at each end of the RS 232 or Ethernet cable shall be adequately protected against transient over-voltages, lightning effects (particularly if the set and remote alarms are in separate buildings), switching surges, power system surges or mains and alternator borne noise/interference.

The controller will incorporate the following functions:

- Mains sensing
- Alternator output-voltage sensing
- Alternator over- frequency sensing
- Control of processor unit (self-diagnostics)
- Alarm/ Status indications
- Control selector and operation
- Phase rotation monitor

A 4- position control selector on the controller will be provided to facilitate the following modes of operation:

- OFF: Diesel/ alternator generator set switched off
- MANUAL: Mains bypassed: Diesel/ alternator will not take load
- AUTO: Diesel /alternator takes load on mains failure
- TEST: Diesel /alternator takes load on mains failure
- A standby failure alarm (SF) will be given on the controller and to the output alarms when “Not in Auto” is selected.

The modular generator set controller must monitor the following

When the voltage of the incoming mains varies by more than a pre-program value (default $\pm 10\%$) from the normal voltage on any phase, the controller will signal that the incoming mains will be disconnected and the engine-starting sequence initiated.

When the frequency of the incoming mains varies by more than pre- program value (default $\pm 5\%$) from the normal frequency, the controller will signal that the incoming mains will be disconnected and the engine-starting sequence initiated.

Upon restoration of the incoming mains to the pre-program value (default $\pm 10\%$) of the normal voltage on all phases, the monitor will signal that the load will be disconnected from the alternator and reconnected to the incoming mains.

If the alternator has been disconnected from the load and the incoming mains within the voltage limits of $\pm 10\%$ on all phases, the controller will signal that the load will be reconnected to the incoming mains.

Should the incoming mains fail or not in the specified limits while the engine is running under control of the cooling-off timer, the control for the cooling –off timer in the controller will be cancelled and the load connected to the alternator.

When the output voltage of the alternator varies by more than the pre-program value (default value $\pm 10\%$) on ANY phase, the controller will signal that the load will be disconnected from the alternator and the engine stopped.

A software over and under-frequency monitor will be provided in the controller if the frequency exceeds or drop below pre-programmed values. It will meet the requirements of class G2 governing. The monitor will not be influenced by harmonics.

Note: Software monitors will include adjustable overshoot and undershoot timers to be fully compatible with Class G2 governing.

All timers will be implemented in software.

Incoming supply failure timer

It is essential that incoming supply failures, occurring at short intervals, do not cause a series of starts and stops.

A timer adjustable from 1 s to 10 s required

The timer default value will be generator set to 3 s

The signal generated by the mains voltage monitor will start the timer. If the duration of the signal is less than the generator setting on the timer, the signal is suppressed so that the switching and starting sequence is initiated. However, if the duration of the signal is more than the generator setting on the timer, the signal will be transmitted to initiate the switching and starting sequence.

Incoming supply restoration timer

It is essential that incoming supply failures, occurring at short intervals, do not cause a series of starts and stops.

A timer adjustable from 1 s to 10 s required.

The timer default value will be generator set to 3 s.

The signal generated by the mains voltage monitor will start the timer. If the duration of the signal is less than 150 sec, the signal is suppressed and the timer is regenerated. However, if the duration of the signal is more than 150 sec, the signal will be transmitted to initiate the switching sequence.

Alternator supply/ incoming supply change-over timer

It is essential that the supply be disconnected from the load before the incoming supply is reconnected to the load. This will be software generator settable in the controller with a minimum of 5 seconds and maximum of 20 seconds.

On receipt of the switching signal, the alternator supply will be disconnected from the load and timer started. After 5 sec, the incoming supply will be reconnected to the load.

Engine cooling-off timer

After the load has been transferred to the incoming supply the engine will run without load for a period to cool off and then stop.

A timer, software adjustable in the controller from 5 to 10 min is required.

Repeat- start control

A repeat- start control is required in the controller software adjustable so that in the event of the engine failing to start on the first start attempt, the starter motor will be released and repeat the start attempt. The repeat-start attempt will be repeated 3 times.

The duration of each start attempt will be 6 sec with a period of 15 sec between successive start attempts.

Should the engine fail to start after the third start attempt, the controller will transmit a signal for alarm purposes.

In addition to the requirement for the switchboard instruments listed elsewhere in this document metering will also form part of the modular generator set controller and must be accessible on the software.

The modular generator set controller shall display the following alarm/status indications:

- High engine temperature.
- Low Oil pressure
- High/low alternator output voltage
- Over and under speed (frequency)
- Low water level
- Emergency stop activated
- Mains fail
- Battery charger fail
- Dummy load in operation (When provided)
- Unit not in Auto
- Engine running
- Low fuel alarm
- Engine start failure

Conditions one to six above will stop the engine.

The Contractor shall provide a remote alarm mimic panel and the associated control wiring for the set. The panel shall be installed in the duty/security room at the entrance to the building approximately 70 m from the generator set position.

The mimic panels must fit into furniture and blend with the design. Before manufacture, the Contractor shall submit and obtain the approval, from the Engineer, for the mimic panel.

The remote alarm must have potential free relay contacts which shall indicate the following on each set:

- 1) Mains on/off
- 2) Alternator running
- 3) Common fault alarm
- 4) Buzzer which can only be reset at the generator panel
- 5) Fuel low

The cable between the remote alarms is to be a signal cable with a screen and this option must be able to operate from a 12 / 24 V dc supply so that it can be powered from the generator set batteries.

A facility to originate a fault message should a warning or shutdown fault occur.

A facility to allow the mode of the control system to be changed to any of the four modes to allow the set to be run from a remote location.

A facility to originate a call to the control cellular and to transfer a fault message should a warning or shutdown fault occur. The alarm conditions above from the controller will be extended to four relays with a make and break contact and terminal strip to allow for remote monitoring of the following alarms:

- Mains fail
- Standby run
- Standby fail
- Low Fuel

A remote start facility must be supplied, software controllable in the controller.

All events relating to the status of the generator set shall be logged with date and time in a non-volatile memory (which can retain information for a period of 6 months in the absence of power to the controller) and the user shall be able to contain a hard copy on site.

The modular generator set controller system must be able to operate with a minimum DC supply voltage of 4 volts (without making use of either an internal or an external auxiliary battery) to allow cranking and starting under conditions of low battery capacity. Control cables between the set and the control panel shall be fitted with sockets for ease of undoing in the event the modular generator set controller has to be removed.

2.3.5. Manual Starting

Each switchboard shall be equipped with two pushbuttons marked "START" and "STOP" for manual starting and stopping of the set.

2.3.6. Battery Charging Equipment

Each switchboard shall be equipped with battery charging equipment.

The charger shall operate automatically in accordance with the state of the battery and shall generally consist of an air-cooled transformer, a full wave solid state rectifier, and the necessary automatic control equipment of the constant voltage system.

The charger must be fed from the mains. An engine driven alternator must be provided for charging the battery while the set is operational. Failure of this alternator must also activate the battery charger failure circuit.

The starter battery voltage will be software monitored by the modular generator set controller. The voltage will be digitally displayed.

2.3.7. Switchboard Instruments

Each generating set shall have a switchboard equipped as follows:

- a) One flush square dial voltmeter, reading the alternator voltage, scaled as follows:
 - (i) 0 - 300 V for single phase generators.
 - (ii) 0 - 500 V for three phase generator. In this case a six position and off selector switch must be installed for reading all phase and phase to neutral voltages.
- b) A flush square dial combination maximum demand and instantaneous ampere meter for each phase, with resettable pointer suitably scaled 20% higher than the alternator rating. A red arc stripe above scale markings from 0 – 20 A and a red radial line through the scale at full-load current, shall be provided. These instruments shall be supplied complete with the necessary current transformer.
- c) One flush square dial vibrating type frequency meter, indicating the alternator frequency.
- d) A six digit running hour meter with digital counter, reading the number of hours the plant has been operating. The smallest figure on this meter must read 1/10 hour.
- e) Fuses or m.c.b.'s for the potential voltage circuits of the meters.
- f) One flush square dial ampere meter suitably scaled for the battery charging current.
- g) One flush square dial voltmeter with a spring loaded pushbutton or switch for the battery voltage.

2.3.8. Marking

All labels, markings or instructions on the switchgear shall be in English.

2.3.9. Earthing

An earth bar must be fitted in the switchboard, to which all non-current carrying metal parts shall be bonded.

The neutral point of the alternator must be solidly connected this bar by means of a removable link labelled "EARTH". Suitable terminals must be provided on the earth bar for connection of up to three earth conductors, which will be supplied and installed by others.

2.3.10. Operation Selector Switch

A four position selector switch must be provided on the switchboard marked "AUTO", "MANUAL", "and TEST" and "OFF".

With the selector on "AUTO", the set shall automatically start and stop, according to the mains supply being available or not.

With the selector on "TEST", it shall only be possible to start and stop the set with the pushbuttons, but the running set shall not be switched to the load.

With the selector on "MANUAL", the set must take the load when started with the pushbutton, but it must not be possible to switch the set on to the mains, or the mains onto the running set.

With the selector on "OFF", the set shall be completely disconnected from the automatic controls, for cleaning and maintenance of the engine.

2.3.11. Automatic Change-over System

A fully automatic change-over system must be provided to isolate the mains supply and connect the standby set to the outgoing feeder in case of a mains failure and reverse this procedure on return of the mains.

The contactors for this system must be electrically and mechanically interlocked.

2.3.12. By-pass Switch and Main Isolator

The switchboard shall be equipped with an on-load isolator to isolate the mains and a manually operated on-load 4 pole 4 position by-pass switch, which shall switch the connected loads as follows:

NORMAL: will allow for the normal connection i.e. connects the incoming mains to the Automatic control gear or directly to the outgoing feeder.

In the GEN BY-PASS position the switch will disconnect the automatic changeover control gear, and will connect the municipal mains directly the essential supply busbar which will allow for the maintenance of either or both the generator and the automatic changeover equipment.

MAINS BY-PASS switching position would allow the generator to be connected directly to the essential supply busbar. This is when there is a problem with the automatic changeover equipment and there is no municipal power available.

The final position is an OFF position which will remove all power downstream of this switch.

It is required that this by-pass switch and mains isolator be mounted away from the automatic control gear, in a separate compartment, either on the side or in the lower portion of the switchboard cubicle, and that the switches are operated from the front of the compartment.

Contractor to note: The by-pass and mains isolator switch shall also break the main neutral.

2.3.13. Start Delay

Starting shall be automatic in event of a mains failure. A 0 - 15 second adjustable start delay timer shall be provided to prevent start-up on power trips or very short interruptions.

2.3.14. Stop Delay

A stop delay with timer is required for the set, to keep the set on load for an adjustable period of one to sixty seconds after the return of the mains supply, before changing back to the supply. An additional timer shall keep the set running for a further adjustable cooling period of 5 to 10 minutes at no-load before stopping.

2.4. Installation

Except for the supply of the incoming mains cable and outgoing feeder cables, the tenderer must include for the complete installation and wiring of the plant in running order, including the connection of the incoming cable and outgoing feeder cables.

The connecting of the cable and control cabling to the generator and the control terminals in the LV board remains the responsibility of the tenderer.

2.5. Warning Notices

Notices, in English, must be installed on the outside of the steel enclosure.

The successful tenderer must consult the Occupational Health and Safety Act 83 of 1993 and get approval of the wording from the Department's representative, prior to ordering the notices.

The notice shall be made of a non-corrodible and non-deteriorating material, preferable plastic, and must read as follows:

DANGER: This engine will start without notice. Turn selector switch on control board to "OFF" before working on the plant.

An engraved label shall be installed next to the fuel cap that indicates the following:

- Base Tank Capacity
- Bulk Tank Capacity (if provided)
- Full load litres per hour consumption

2.6. Construction

The engine and alternator of the set shall be built together on a common frame, which must be mounted on a skid base on anti-vibration mountings. The set must be placed inside an IP65 canopy/container. A drip tray must be fitted under the engine. The tray must be large enough to catch a drip from any part of the engine.

The frame must be of the 'DUPLEX' type.

2.7. Operation

The set is required to supply the lighting and power requirements in the case of a mains power failure.

The set shall be fully automatic i.e. it shall start when any one phase of the main supply fails or get switched and shall shut down when the normal supply is re-established. In addition it shall be possible to manually start and stop the set by means of pushbuttons on the switchboard.

The automatic control shall make provision for three consecutive starting attempts. Thereafter the set must be switched off, and the start failure relay on the switchboard must give a visible and audible indication of the fault.

To prevent the alternator being electrically connected to the mains supply when the mains supply is on and vice versa, a safe and fail proof system of suitably interlocked contactors shall be supplied and fitted to the changeover switchboard.

SECTION 3 – TECHNICAL SPECIFICATION

TABLE OF CONTENTS

3.1.	General	159
3.2.	Site Information and Conditions	159
3.2.1.	Location	159
3.2.2.	Site Conditions	160
3.3.	Output and Voltage	160
3.4.	Switchboard/Control Panel Unit.....	160
3.5.	Cables.....	161
3.6.	Engine.....	161
3.7.	Alternator	161
3.8.	Load Acceptance.....	162
3.9.	Enclosure.....	162
3.10.	Alarms.....	164
3.11.	Remote Control Generator Switch	164
3.12.	Fuel Drip Tray	165
3.13.	Completion Time	165
3.14.	Inform.....	165
3.15.	Fuel Supply Tank.....	165

3. SECTION 3 – TECHNICAL SPECIFICATION

3.1. General

Supply, deliver, install, commission, test and maintain two emergency generating sets at Thabong (Welkom) SAPS Training Facility.

This installation must comply fully with all the sections and drawings of this document. This technical specification is supplementary to the Equipment Requirements, Section 2, and must be read together where they are at variance the Technical Specification shall apply.

Supply, delivery, installation and commissioning of the complete outdoor emergency generator sets inside an IP65 canopy/container on a concrete plinth as specified in this document and indicated on the drawings.

Concrete plinth to be provided as per drawing

The surface of the concrete plinth shall be 50 mm higher than the existing ground level. The thickness and strength of the plinth shall be designed by the consulting engineer and are detailed on the drawings.

A tap to be provided to drain all the water that accumulates inside the bund wall. Final position of the tap will be determined on site. It is the engineer's responsibility to ensure plinth design complies with generator dimensions and weights. The bund wall shall contain 110% of the fuel, oil and water capacity of the generator. The bund wall shall not constrain the canopy doors from opening completely.

The contractor shall install an earthing system in the concrete plinth. The contractor shall install two (2) earth studs 1,8 meters long on opposite corners of the concrete plinth into the ground. The earth studs shall be connected by means of a 70 mm² bare copper earth wire to the main earth bar in the control panel. The earth conductor shall be connected to the earth bar, canopy, bass, skid and earth bar by means of suitably crimping lugs and brass bolts.

3.2. Site Information and Conditions

3.2.1. Location

The site is at Thabong (Welkom).

3.2.2. Site Conditions

The following site conditions will be applicable and equipment shall be suitably rated to develop their assigned rating and duty at these conditions.

- | | | |
|---|---|-------------|
| a) Height above sea level | : | 1 350 meter |
| b) Maximum ambient temperature | : | 30,2 °C |
| c) Maximum ambient humidity at lowest temperature | : | 43% |

3.3. Output and Voltage

After the de-rating factors for the engine and generator due to site conditions have been taken into account, the set must have a site output and voltage as follows: -

		GENERATOR 1	GENERATOR 2
No load voltage	:	400 / 230 Volt	400 / 230 Volt
Rating	:	300 kVA	300 kVA
Power at 0.9 power factor	:	270 kW	270 kW
Frequency	:	50 Hz	50 Hz
Fault Level	:	10 kA	10 kA

The generating set is required to feed the following electrical load:

	GENERATOR 1	GENERATOR 2	Load kW	Power factor
Discharge lighting	50 kW	65 kW		0.9
Fluorescent lighting	10 kW	20 kW		0.85
LED lighting	70 kW	100 kW		
Heaters & plugs	60 kW	85 kW		0.8
Computers & radios	10 kW	30 kW		0.9
Kitchen equipment	100 kW	Nil		0.8

3.4. Switchboard/Control Panel Unit

All switch- and control gear shall be rated for a fault current level of 10 kA.

The switchboard/control panel unit shall be enclosed in the IP65 canopy/container.

3.5. Cables

The contractor will be responsible for all electrical cable connections associated with the complete generating set installation.

The following cables will be supplied, installed and terminated at the Switchboard by others. Adequate provision shall be made for the termination of these cables at the Switchboard:

DB fed from Generator_1:	DB-G1(E):	120 mm ² PVC PVC SWA PVC x 4-core cable
	DB-G2(E):	95 mm ² PVC PVC SWA PVC x 4-core cable
	DB-G3(E):	70 mm ² PVC PVC SWA PVC x 4-core cable
	DB-K(E):	50 mm ² PVC PVC SWA PVC x 4-core cable
	DB-GH(E):	16 mm ² PVC PVC SWA PVC x 4-core cable
	DB-PH(E):	16 mm ² PVC PVC SWA PVC x 4-core cable
DB fed from Generator_2:	DG-G(E):	35 mm ² PVC PVC SWA PVC x 4-core cable
	DB-W(E):	95 mm ² PVC PVC SWA PVC x 4-core cable
	DB-H(E):	95 mm ² PVC PVC SWA PVC x 4-core cable
	DB-N(E):	95 mm ² PVC PVC SWA PVC x 4-core cable
	DB-E(E):	70 mm ² PVC PVC SWA PVC x 4-core cable

3.6. Engine

A sump drainpipe must be fitted with a shut-off valve placed in a convenient position outside the base frame to facilitate drainage.

Recommended oil types must be indicated on the engine, or base frames, by means of suitable labels.

All engine instruments shall have clear markings on the faceplates, indicating the normal operating zone(s), maximum and minimum allowable values/limits and danger zone(s).

The flywheel shall be covered by approved hoods.

3.7. Alternator

The Alternator shall be of the low harmonic type.

3.8. Load Acceptance

The generator set shall be capable of accepting 75% of the specified site electrical output 10 seconds after the starter motor is energised and the remaining 25%, 5 seconds thereafter, i.e. 100% load acceptance shall not exceed 15 seconds.

3.9. Enclosure

The standby set is a free standing unit and shall be mounted in an enclosure as detailed below:-

3.9.1 General

The enclosure, shall be completely vermin-proof, powder coated and shall be constructed of 3CR12 stainless steel or within 50 km from the coast with grade 316 steel housing of a minimum thickness of $\pm 1,5$ mm.

The enclosure shall allow easy access to the engine, alternator, radiator filler cap and control cubicle for maintenance purposes.

The door shall be flush with the rest of the canopy and of the side opening type. A minimum of four doors are required i.e. two on either side.

The door hinges and locking bars shall be of a heavy duty type and be manufactured of 3CR12 stainless steel or within 50 km from the coast with grade 316 steel and shall be fitted with a grease nipple.

The doors and panels shall be suitably braced and stiffened to ensure rigidity and to prevent bending and warping.

Suitable door restraints shall be fitted to all the doors, enclosure including the control panel to prevent wind damage. The restraint shall consist of a steel rod in a steel groove or slide with a spring loaded catch, which is to be manually reset to close the door.

No flexible restraints will be accepted.

The diesel fuel level indicator and alternator rating plate shall be clearly visible with the doors open.

Unless specified the silencers shall be mounted within the enclosure.

Perforated sheeting shall be fitted over all the insulating material inside the canopy of all soundproof sets.

Rubber seals on doors shall be equal to or similar to rubber pinch weld, wind lace.

3.9.2 Design

The enclosure shall be designed to be weather-proof and sound-proofing as specified. Rivets or self-tapping screws will under no circumstances be allowed for fixing the various sections of the enclosure. Only cadmium coated nuts and bolts are acceptable.

3.9.3 Roof

The roof of the enclosure shall be constructed for proper drainage of water as per the drawing.

3.9.4 Lamp fitting

A lamp fitting and its associated on/off door switch shall be provided inside the enclosure for illumination of the control panel. The power for the lamp shall be obtained from the starter battery.

3.9.5 Sound-proofing

The sound-proofing on canopy engine sets shall be such that the maximum noise level generated by the set under any load condition shall not exceed 65 dB measured in any direction at a distance of 5m from the centre of the set with the doors closed.

The supply and discharge air paths will require separate attenuators on soundproof sets.

3.9.6 Padlock and keys

The contractor shall supply padlocks and keys for all the doors of the enclosure. The padlock shall be of the "Viro A82 keyed alike with stainless steel shackles" type.

Suitable brass metal plates shall be installed behind each lock for the protection of the enclosure against scratching or damaging, where the locks are hanging.

3.10. Alarms

The successful tenderer must pay particular attention to the requirements of the alarms as described in the Equipment Requirements, Section 2.

One alarm hooter and red light shall be supplied and installed on the outside of the generator container in a position as indicated by the Department's Representative.

The hooter shall consist of an electronic unit similar and equal to a "Klaxon" - type SY2/725 hooter with a continuously rated output and 110 dB at a distance of 2 metres, and shall be IP55 weatherproof rated.

The warning light shall consist of a 40 W flashing red light, which shall be mounted on a galvanised steel frame together with the hooter.

The hooter and light shall be switched on or off simultaneously after initiation or cancellation of an alarm condition. The supply and installation of the wiring between the control board and the alarm unit forms part of this contract.

The successful tenderer must ensure that the hooter control circuit resets automatically after cancellation due to a low fuel condition or battery charger failure, but the visible fault indication must remain, i.e. should the operator continue to run the set, the hooter must sound, should any other condition develop.

A remote alarm panel shall be supplied and installed by the contractor in the control room. This shall be of surface mounting, enamelled sheet metal (colour to approval), minimum depth construction, and shall incorporate a flashing red pilot alarm light, adjustable electronic sounder, and a silence push button. The silence button shall not switch off the pilot light - this shall only be switched off when the alarm is reset at the Generator Panel.

A 2,5 mm² x 4-core PVC SWA PVC cable will be supplied, installed and terminated by others between the Generator Panel and the Charge Office. The Contractor shall connect this cable at both ends and shall supply and install all switch gear relays, etc. to ensure satisfactory operation of the Remote Alarm Panel.

3.11. Remote Control Generator Switch

A Remote Control Generator "ON/OFF/AUTO" switch will be supplied and installed by others in the control room, and a 2,5 mm² x 4-core PVC SWA PVC cable will be supplied and installed by others between the control room and the Generator Panel.

The contractor shall connect this cable at both ends, and shall supply and install all switch gear, relays, etc. to ensure satisfactory operation of the remote control switch.

3.12. Fuel Drip Tray

A drip tray approximately 100 mm deep shall be mounted below the generator and must be large enough to collect any fuel that drips from the generator fuel accessories. The drip tray shall be manufactured from black mild steel. The thickness of the drip tray sheet steel shall not be less than 2 mm.

3.13. Completion Time

The Generator Set is required to be commissioned in conjunction with the building contract.

3.14. Inform

The successful tenderer shall inform the Engineer when the set is ready for installation.

3.15. Fuel Supply Tank

The fuel tank shall be an integral part of the base frame of the generator set. The tank shall have sufficient capacity to run the engine on full load for a period of 24 hours. The base tank shall be an open channel self-bund walled type that shall be of sufficient capacity to contain a spillage equivalent to 110% in volume of the base tank. The containment tank shall be manufactured from black mild steel with a thickness of not less than 2 mm.

A float level alarm connected to the generator controller shall be incorporated into the bund area located such that the alarm will be activated when 50% of the volume of the bund area has been reached in the event of any diesel fuel leakage.

SECTION 4 – SCHEDULES OF TECHNICAL INFORMATION
(TO BE FULLY COMPLETED BY TENDERER)

TABLE OF CONTENTS

4.1.	Engine.....	167
4.2.	Alternator	169
4.3.	Switchboard	170
4.4.	Battery.....	171
4.5.	Dimensions.....	171
4.6.	Deviation from the Specification as an Alternative (State Briefly)	171
4.7.	Spare Parts and Maintenance Facilities.....	172

4. SECTION 4 – SCHEDULES OF TECHNICAL INFORMATION

4.1. Engine

NO	ITEM	REMARKS
1.	Manufacturer's Name	
2.	Country of Origin	
3.	Manufacturer's model No. and year of manufacture	
4.	Continuous sea level rating after allowing for ancillary equipment : a) In b.h.p. b) In kW	
5.	Percentage de-rating for site conditions, in accordance with SANS 8528 a) For altitude b) For temperature c) For humidity d) Total de-rating	
6.	Net output on site in kW	
7.	Nominal speed in r.p.m.	
8.	Number of cylinders	
9.	Strokes per working cycle	
10.	Stroke in mm	
11.	Cylinder bore in mm	
12.	Swept volume in cm ³	
13.	Mean piston speed in m/min	
14.	Compression ratio	
15.	Cyclic irregularity	
16.	Fuel consumption of the complete generating set on site in l/h of alternator output at : a) Full load b) $\frac{3}{4}$ load c) $\frac{1}{2}$ load NOTE : A tolerance of 5% shall be allowed above the stated value of fuel consumption.	
17.	Make of fuel injection system.	
18.	Capacity of fuel tank in litres	

NO	ITEM	REMARKS
19.	Is gauge glass fitted to tank?	
20.	Is electric pump for filling the fuel tank included?	
21.	Method of starting	
22.	Voltage of starting system	
23.	Method of cooling	
24.	Type of radiator if water-cooled	
25.	Type of heater for warming cylinder heads	
26.	Capacity of heater in kW	
27.	Method of protection against high temperature	
28.	Method of protection against low oil pressure	
29.	Type of governor	
30.	Speed variation in % a. Temporary b. Permanent	
31.	Minimum time required for as assumption of full load in seconds	
32.	Recommended interval in running hours for : a. Lubricating oil change b. Oil filter element change c. Decarbonising	
33.	Type of base	
34.	Can plant be placed on solid concrete floor?	
35.	Are all accessories and ducts included?	
36.	Is engine naturally aspirated?	
37.	Are performance curves attached?	
38.	Diameter of exhaust pipe	
39.	Noise level in plant room in dBA	N/A
40.	Noise level at tail of exhaust pipe in dBA	
41.	BMEP (4 stroke) at continuous rating (kPa)	
42.	% Load acceptance to SANS 8528, with 10% transient speed drop	

4.2. Alternator

NO	ITEM	REMARKS
1.	Maker's name and model no.	
2.	Country of Origin and year of manufacture	
3.	Type of enclosure	
4.	Nominal speed in r.p.m.	
5.	Number of bearings	
6.	Terminal voltage	
7.	Sea level rating kVA at 0,9 power factor	
8.	De-rating for site conditions	
9.	Input required in kW	
10.	Method of excitation	
11.	Efficiency at 0,9 power factor and : a) Full load b) $\frac{3}{4}$ load c) $\frac{1}{2}$ load	
12.	Maximum permanent voltage variation in %	
13.	Transient voltage dip on full load	
14.	Voltage recovery on full load application in milli-seconds	
15.	Is alternator brushless?	
16.	Class of insulation of windings	
17.	Is alternator tropicalised?	
18.	Symmetrical short circuit current at terminals in Ampere	
19.	Type of Coupling	

4.3. Switchboard

NO	ITEM	REMARKS
1.	Maker's Name	
2.	Country of Origin	
3.	Is board floor mounted?	
4.	Finish of board	
5.	Make of volt, amp, and frequency meters	
6.	Dial size of meters in mm	
7.	Scale range of voltmeter	
8.	Scale range of ammeters	
9.	Ratio of current transformers	
10.	Make of hour meter	
11.	Range of cyclometer counter	
12.	Smallest unit shown on counter (Item 11)	
13.	Make of circuit breaker	
14.	Type of circuit breaker	
15.	Rating of circuit breaker in Amp and fault level in kA	
16.	Setting range of overload trips	
17.	Setting range of instantaneous trips	
18.	Make of change-over equipment	
19.	Make of voltage relay	
20.	Is control and protection equipment mounted on a small removable panel?	
21.	Type of control equipment	
22.	Make of mains isolator	
23.	Type of indicators for protective devices	
24.	Make of rectifier	
25.	Type of rectifier	
26.	Is battery charging	
27.	Are volt- and ammeters provided for charging circuit?	
28.	Is the alarm hooter of the continuous duty type?	
29.	Rating in Amps of : a. Change-over equipment b. Mains on load isolator c. By-pass switch d. Circuit breaker to outgoing feed	

NO	ITEM	REMARKS
30.	Is manufacture of switchboard/control panel to be sub-let?	
31.	If yes, state name and address of specialist manufacturer	

4.4. Battery

NO	ITEM	REMARKS
1.	Maker's Name	
2.	Country of Origin	
3.	Type of battery	
4.	Voltage of battery	
5.	Number of cells	
6.	Capacity in cold crank amp	

4.5. Dimensions

NO	ITEM	REMARKS
1.	Overall dimensions of set in mm	
2.	Overall mass	
3.	Is the canopy/container adequate for the installation of the set, switch board and fuel tank	

4.6. Deviation from the Specification as an Alternative (State Briefly)

NO	DESCRIPTION

4.7. Spare Parts and Maintenance Facilities

NO	ITEM	REMARKS
1	Approximate value of spares carried in stock for this particular diesel engine and alternator	
2	Where are these spares held in stock	
3	What facilities exist for the servicing of the equipment offered	
4	Where are these facilities available	

SECTION 5 – PRICE SCHEDULES

TABLE OF CONTENTS

5.1.	General	173
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5. SECTION 5 – PRICE SCHEDULES

5.1. General

- 1) The conditions of contract and the application of the Contract Price Adjustment Provisions shall be as set out in Part A: Section 1: Preliminaries.
- 2) The descriptions in this Price Schedule shall be read in conjunction with the specification.
- 3) The unit rate for each item in the Price Schedules shall include for all materials, labour, profit, transport, etc., everything necessary for the execution and complete installation of the work in accordance with the description.
- 4) The Price Schedules shall not be used for ordering purposes. The Contractor shall check the lengths of cables and overhead conductors on site before ordering any of the cables. Any allowance for off-cuts shall be made in the unit rates.
- 5) The rates shall exclude Value Added Tax and the total carried over to the final summary in PART A.
- 6) All material covered by this Specification shall, wherever possible, be of South African manufacture.

**PLEASE REFER TO BILLS OF QUANTITIES OF THE MAIN CONTRACTOR FOR
PRICING!!**

MECHANICAL SPECIFICATIONS



NATIONAL DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE

TECHNICAL SPECIFICATIONS FIRE PROTECTION SERVICES

THABONG SAPS TRAINING ACADEMY– REPAIR AND RENOVATION

TABLE OF CONTENTS

1. INTRODUCTION	11
2. SCOPE OF WORK	11
3. WORK, PLANT, EQUIPMENT AND SERVICES ETC. EXCLUDED	11
4. WORK, PLANT, EQUIPMENT AND SERVICES ETC. INCLUDED.....	12
5. GENERAL DESCRIPTION: FIRE PROTECTION SYSTEM	12
5.1. Piping	13
5.2. Hydrants	13
5.3. Hose reels.....	14
5.4. Extinguishers	14
5.5. Fire Signage	14
5.6. General	14
6. GAS EXTINGUISHING CONTROL SYSTEM	14
6.1. General	15
6.2. Standards	15
6.3. Aerosol Generator.....	17
6.4. Panel Features.....	17
6.5. Panel Construction.....	19
6.6. Panel Indications.....	19
6.7. Panel Controls	19
6.8. Software.....	20

6.9. Configuration.....	20
6.10. Sonos Sounder	20
6.11. Sonos Beacon.....	21
6.12. Optical Smoke Detector	21
6.13. Fire Bell.....	21
6.14. Power Supplies	22
6.15. Additional System Components	22
7. APPROVALS.....	22
8. BATTERY LIMITS	22
8.1. Civil.....	22
9. ALLOCATED SPACE	22
10. COORDINATION WITH OTHER TRADES	23
11. BUILDER'S WORK.....	23
12. DRAWINGS	23
13. SHOP DRAWINGS	24
14. MATERIALS, WORKMANSHIP AND EQUIPMENT OFFERED	24
15. STATUTORY AND REGULATORY REQUIREMENTS, DOCUMENTATION AND DRAWINGS.....	25
16. SANS SPECIFICATION.....	26
17. GUARANTEE AND MAINTENANCE	26

18.	COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS.....	26
19.	PERFORMANCE OF SYSTEMS AND EQUIPMENT	27
20.	PAINTING.....	27
21.	CORROSION PRECAUTIONS AND FINISHES.....	27
22.	DAMAGE	28
23.	TUITION	29
24.	TENDER SUBMISSIONS.....	29
25.	COMMISSIONING	29
26.	OPERATING AND MAINTENANCE MANUALS.....	30
27.	FIRE CERTIFICATION	31
28.	DRAWINGS.....	31

1. INTRODUCTION

The purpose of this document is to describe the scope of works required for the fire protection service at the Thabong SAPS Training Academy, located at 8004/1 Modikeng Road, Welkom, Free State.

The scope of the successful bidder shall be described in this document and shall be referred to as the Fire Contractor (FC).

This document describes the supply and installation of the auxiliary protection, associated signage and interface with the civil connections.

This document must be read in conjunction with the reference drawings and bill of quantities.

The successful fire contractor will be the sub-contractor to the main building contractor on site.

The successful fire contractor must ensure that they are able to meet the program dates of the main contractor including commissioning and hand-over.

2. SCOPE OF WORK

The scope of work is the installation of fire protection equipment, fire piping and fire signage. The piping installation shall be from the fire incoming line of the civil connection.

3. WORK, PLANT, EQUIPMENT AND SERVICES ETC. EXCLUDED

The items of plant, equipment and work listed hereunder are specifically excluded from the scope of the contractor's obligations.

The tenderer will however furnish full details in the tender data sheets of any further items of equipment, material and work not provided for in its tender

List of exclusions;

- Tap off from civil water line
- Underground piping from communication line into site and associated fittings
- Detection (Manual call points)
- Emergency lighting

All items of plant, equipment and work not listed above and in the tender data sheets as being excluded, will be deemed to be included in the tender and / or contract prices.

4. WORK, PLANT, EQUIPMENT AND SERVICES ETC. INCLUDED

This Specification provides and includes for;

- The design, manufacture, inspection, testing, supply, packing, forwarding and delivery of plant, equipment and materials to the site, including the payment of all freight, insurance, import, customs, excise and other duties, levies, forwarding, railage and all other transportation and delivery charges.
- The furnishing of "know-how", for the successful operation/functioning of the plant/equipment/process.
- Management of manufacturing and delivery of piping, hydrant fittings, hose reels and fittings, extinguishers and fire signage.
- Interface with main building contractor and civil contractor during installation and commissioning.
- The supply and delivery of commissioning spares.
- The supervision of and responsibility for the commissioning including preliminary trials, final testing, starting, setting to work, proving and handing over to Client of all plant, equipment and materials in full working order under the stated operating conditions and complying with the performance and other guarantees specified.
- The supply of all specified operating, training and maintenance information including complete parts data, parts manuals (if applicable) and drawings as specified.
- The remedy of the plant and equipment during the "Defects Liability Period".
- The supply of all services, information and data.
- Any other items not covered by the foregoing, but forming part of the contractor's obligations and responsibilities.

5. GENERAL DESCRIPTION: FIRE PROTECTION SYSTEM

The General Description must be read in conjunction with the bill of quantity and relevant drawings.

5.1. Piping

The FC scope with respect to the piping begins at the underground fire water take-off points. The take-off position is marked up on the fire drawings, if the suggested take off point is deemed unsuitable, the FC must notify the Engineer immediately, so that a new take off point can be determined. The underground take-off point must be from a dedicated fire line.

Piping to be SANS 62-1/2 Medium Black steel and are to be painted signal Red (A10) as per SANS 10140-1 and to be treated as per paint supplier specification. Piping will contain directional arrows indicating flow of water. The system is to be a wet system.

The methodology of paint application procedure to be submitted for approval prior to application.

The FC shall be responsible for the HDPE flange adaptor and associated steel SANS 1123 1600/3 mating steel flange which will be welded onto associated medium black steel pipe.

The above mentioned connection and all underground steel pipes are to be wrapped in high adhesive petrolatum tape.

Take offs for Hydrant systems shall be 100 NB steel pipe.

Take offs for Hose reel only lines are to be 32 NB or 25 NB steel pipe sizes as indicated on fire drawings.

Pipes are to be supported from the wall soffit or roof truss with rubber encased clamps. 32NB piping is be supported at every 3.0 m on vertical runs and 2.4 m on horizontal runs. 25 NB piping is be supported at every 3.0 m on vertical runs and 2.4 m on horizontal runs.

Routing of piping to be confirmed on site with professional team to ensure aesthetically pleasing finish.

Piping will be flushed and pressure tested before commissioning.

5.2. Hydrants

Hydrants and boosters will to be installed on the site at positions shown on the fire drawings.

Hydrants to be in line with SANS 1128-1.

5.3. Hose reels

30m long Signal Red fire hose reels will be installed on the site at positions shown on the fire drawings.

5.4. Extinguishers

4.5 kg DCP type fire extinguisher will to be installed on hook or placed within a fire box. Fire extinguishers to comply with SANS 1910, Portable refillable fire extinguishers. The procurement of the box by the FC or Architect will be confirmed prior to the commencement of the installation.

5.5. Fire Signage

Photo luminescent fire signage will be installed for escape routes, escape direction arrows, hose reel, hydrant, and red directional arrow.

Size of signage to be in line with SANS 1186-1/5 and ensure visibility from 18 m.

5.6. General

The contractor will as part of the contract also allow for:

All the foregoing will be carried out by the Contractor in accordance with the Specification and the other contractual documentation to complete the Contract Works within the Contract Program and at the Contract Price stated in the Contract.

The whole of the Contract Works will be complete in every respect, ready for operation and continuous production at full load. Should any part or parts of the plant/ work/ services/ information which may be necessary for the satisfactory operation and maintenance of the plant/ equipment be omitted by the Contractor, such items will be provided expeditiously by him free of all extra cost to the Client.

6. GAS EXTINGUISHING CONTROL SYSTEM

The gas extinguishing control system (gas fire suppression) shall be provided in the following areas;

- Registry room
- Server room
- Archive

6.1. General

The system shall include all materials, equipment and wiring required to install the complete Extinguishing Control System. The system shall include but not be limited to a single area conventional extinguishing control panel (hereafter known as FACP) with integral power supply, manual release devices and remote status indicators as required, sensors, solenoid/actuator release devices, hold/abort switches, audible and visual indication and all accessories to provide a complete system.

The system components shall be freely available from a number of sources, (i.e. not a closed protocol system), and shall support conventional devices from various manufacturers.

The installation shall include the laying of all cables required for connectivity of the Detection, Releasing Mechanisms, Alarm Indicating Equipment, and Power Supplies appropriate to the design. All cabling shall conform to the requirements and recommendations of the control equipment manufacturer. Any openings / chasings in walls, ceilings or floors shall be made good.

The system shall be designed in such a manner, that no more than 90% of the available detection circuit capacity is employed in order to allow for future expansion.

6.2. Standards

The Extinguishing Control system shall be installed and commissioned in accordance with, and shall meet all the requirements of the following standards;

- BS5839-1: 2002 - Code of Practice for fire detection and fire alarm systems
- BS7273-1:2006 - Code of Practice for the operation of fire protection measures
- EN15004-1 - Fixed firefighting systems - Gas extinguishing systems - Design, installation and maintenance

The responsible sub-contractor should be able to demonstrate their competence to design, install and commission the system, e.g. by certification to BAFE SP203, LPS1014 or other relevant standard.

The equipment manufacturer shall operate a quality management system in accordance with ISO 9001: 2000. In addition, the equipment shall be manufactured under a recognised factory control procedure in accordance with the requirements of the Construction Products Directive 89/106/EEC.

All detection and alarm devices shall be independently certified as complying with the relevant EN54 standard.

The Panel shall be independently certified as complying with requirements of EN12094 -1: 2003 and EN54-2:1997, A1:2006, EN54-4:1997, A1:2002, A2:2006 for which an EC Certificate of Conformity shall be available.

In addition to the basic requirements of EN54-2, the Fire Alarm Control Panel shall offer, as a minimum, the following optional features with requirements;

Optional Functions:		EN54-2 Clause
Indication	Fire alarm counter	7.13
Outputs	Outputs to fire alarm devices	7.8
Controls	Test condition	10

In addition to the basic requirements of EN12094-1, the Extinguishing Control Device shall offer, as a minimum, the following optional features with requirements;

Optional Functions:		EN12094-1 Clause
Delay of extinguishing signal		4.17
Monitor Flow of Extinguishing Agent		4.18
Monitoring of status of components		4.19
Emergency Hold Device		4.20
Control of flooding time: 0 – 600s		4.21
Manual Only Mode		4.23
Triggering Signals to Equipment within the System		4.24

Triggering Signals to Equipment outside the System	4.26
Emergency Abort Device	4.27
Activation of Alarm Devices with Different Signals	4.30

6.3. Aerosol Generator

The generator housing shall be constructed of exterior and interior stainless steel shells separated by an insulating material. Top and bottom of housing shall be stainless steel and (for electrically activated units) incorporate a ¾" NPT fitting to enable direct connection to conduit. Housing shall be sealed with a non-permeable membrane and shall incorporate a mechanical means to insure rupture of the membrane upon activation. Housing shall be non-pressurized prior to system activation.

Aerosol generated shall be potassium based and manufacturer shall provide fifteen (15) minute time weighted average data from an independent laboratory demonstrating that the aerosol does not produce (at normal design concentrations harmful levels of CO, CO₂, and NO_x). The aerosol shall have no ozone depletion potential and no global warming potential.

Extinguishing system shall be accomplished by means of distributed generating devices to insure distribution of extinguishing aerosol throughout the protected volume.

Generator devices shall be mounted by means of stainless steel bracketing that allows for directional adjustment through both vertical and horizontal plane.

6.4. Panel Features

The Fire Alarm and Extinguishing Control Panel (FACP) shall be the central controller of the complete system. It shall receive and process information from the detection and/or manual release devices and provide audible and visual indication of alarm and other conditions to the user. It shall automatically or manually initiate alarm response sequences and provide an on-board user interface for interrogation and user programming of the system.

The FACP shall provide a user interface from which; controls can be operated, manual operations can be carried out, indications are audible and/or visible, and system information can be obtained. It shall also be capable of unambiguously indicating the following functional conditions: Quiescent condition, Fire Alarm condition, Fault warning condition, and Disablement condition. Furthermore, the Fire Alarm and Extinguishing release condition shall

always be capable of clearly being indicated without any prior manual intervention at the FACP.

The FACP shall be easy to configure and all basic operating characteristics should be programmable through the user interface on the FACP in order to satisfy the detection zone and output mapping of the premises.

Updates to the FACP operating software shall be simple to undertake and should not require the use of replaceable components. The operating program and configuration memory shall be stored in non-volatile memory, and shall not rely on batteries for retention. The FACP shall incorporate a single microprocessor to control the operation of the detection, signalling, releasing and central processing functionality.

A PC tool operating under the Windows™ operating system shall be available to retrieve configuration settings and logs from the control equipment.

The FACP shall support up to 32 conventional devices per zone input.

The FACP shall provide a facility to enable a simple configuration of the actuator circuit (auto-learn) for either solenoid type or metron type actuators for the controlled release of the extinguishing agent. The circuit shall not require any special configuration or adjustment set-up.

For solenoid type actuator circuits, the FACP shall support solenoids with coil resistances of between 25-200Ω.

The FACP shall provide 3 outputs to fire alarm devices each rated at 1A. An auxiliary supply output shall also be available to provide power for internal option modules.

The FACP shall incorporate a real-time clock and an event log capable of recording the history, and time stamping of the last 500 events.

All fault conditions (except CPU System Fault) shall be non-latching.

It shall be possible to configure cause and effect operation for evacuation, and output control operations at the panel. It shall be possible to assign outputs on a 1st, or 2nd stage basis.

Other key features that shall be provided are:

- Menu driven programming
- Status Change from Automatic to Manual (or optional key switch operation)
- Pass-code for level 2 access (or optional key switch operation)
- Company Logo/Contact Information displayed during normal conditions

- Configurable duty cycle for pulsing alarm-device outputs – these must be independently configurable for two types of 'Alert' pulsing modes and one 'Hold' pulsing mode.

6.5. Panel Construction

The Fire Alarm Control Panel shall be of metal construction. It shall be capable of surface or semi-flush mounting. Sufficient 20mm knockouts shall be provided to accommodate all likely wiring requirements.

The housing shall meet IP30 minimum ingress protection classification. It shall not be possible to open the enclosure without a key or special tool.

6.6. Panel Indications

The Fire Alarm Control Panel shall be equipped with a graphics liquid crystal display (124 x 64 pixels) as the primary indicator giving at least 6-lines of information. The display shall incorporate an LED backlight that will illuminate upon any event (excluding mains failure) or button press.

The primary display shall incorporate a large on-screen countdown timer for clear visibility of the remaining time before the release of the extinguishing agent. It will also be capable of simultaneously indicating the presence of Fire Alarms, Faults, Disablements and Tests conditions.

In addition, the following minimum LED indicators shall be provided in accordance with the requirements of EN54-2 and EN12094-1;

Indications

Fire, Fault, Disable, Test, Power, Silence, Sounder Fault, Sounder Disabled Sounder Delayed, System Fault, Detection Zones Fire (x3), Detection Zones Fault/Test/Disablement (x3), Release Imminent, Released Timer Held Aborted, Disabled, Common Fault, Manual Disabled, Valve Closed, Manual Only, Auto/Manual Mode.

6.7. Panel Controls

The FACP shall be provided with the following minimum manual controls:

- Reset
- Mute Buzzer
- Silence
- Sound / Resound Alarms

In addition, the following controls shall be provided for menu operation and programming;

- Navigation keys, ← → ↑ ↓
- A confirmation key, ✓
- A numeric keypad, 0-9, also providing the function for letter / character programming, Escape key and Menu select key.

6.8. Software

A PC Configuration Tool shall be available for retrieval of the CIE configuration data, and Event Log contents.

The PC Configuration Tool shall be graphically based and operate under Windows™ operating systems XP, Vista, Windows 7, Windows 10 and use USB technology as a means of communication.

6.9. Configuration

It shall be possible to configure ALL configuration parameters, and settings, from the CIE panel.

6.10. Sonos Sounder

The Sonos Sounder shall meet the following operation conditions and requirements;

- Supply voltage – 9 to 60 V DC
- Temperature range – -20°C to 60°C
- IP rating – IP21
- Colour– Red
- Construction – Shallow base flame retardant polycarbonate
- Audibility – 100dbA

6.11. Sonos Beacon

The Sonos Beacon shall meet the following operation conditions and requirements;

- Supply voltage – 17 to 60 V DC
- Temperature range – -20°C to 60°C
- IP rating – IP21
- Colour– Red
- Construction – Shallow base flame retardant polycarbonate



6.12. Optical Smoke Detector

The optical smoke detector shall meet the following operation conditions and requirements;

- Supply voltage – 9 to 33 V DC
- Temperature range – -20°C to 60°C
- Humidity – 0% to 95% relative humidity
- IP rating 23D
- Detector colour and material – White Polycarbonate
- Terminals – Nickel plated stainless steel

6.13. Fire Bell

The fire bell shall meet the following operation conditions and requirements;

- Supply voltage – 19 to 28 V DC
- Temperature range – -10°C to 55°C
- IP rating – IP21C
- Colour– Red
- Construction – Steel
- Size - 6 inch
- Audibility – 95dbA

6.14. Power Supplies

All power supplies (integral to the fire alarm control panel or remote) shall be independently certified and shall be capable of supporting 24 hour standby requirements.

All power supplies shall be capable of operating from a main supply of 230V/50 Hz.

6.15. Additional System Components

The following additional system components shall be provided as optional equipment;

- RSI - Remote Status Indicators for remote control of FACP
- Hold Switch - Providing emergency HOLD operation of the extinguishing release mechanism
- Abort Switch - Providing emergency ABORT operation of the Extinguishing release mechanism
- 8way Relay Card - Providing 8 additional programmable Relay outputs
- AEOL - Active End Of Line monitoring devices for detection circuits

7. APPROVALS

All equipment or material offered shall be from the same manufacturer.

Approval by other organisations shall if it is deemed satisfactory, be granted by the Engineer, on application.

8. BATTERY LIMITS

8.1. Civil

- Underground tap off from fire water civil line.
- Associated flange and steel mating flange is in the scope of the FC.

9. ALLOCATED SPACE

The physical sizes of the equipment offered shall be suitable for the locations shown on the drawings and shall be positioned in such a manner to ensure reasonable access all around

the equipment for maintenance purposes, as recommended by the suppliers of the equipment, or as per any relevant statutory requirements.

Tenderers are to advise the Engineer at close of tender, in the form of a letter enclosed with the tender documents, should any of the plant areas not be adequate to accommodate their equipment. No claim of whatever nature, arising out of the Tenderer's failure to do so, will be entertained.

10. COORDINATION WITH OTHER TRADES

The contractor shall plan his work in advance and shall coordinate all space requirements in conjunction with the Principal Contractor, especially where other trades share the same space. Where conflicts occur, the contractor shall request clarification from the Architect and/or Engineer.

11. BUILDER'S WORK

The successful tenderer shall, within 14 days of acceptance of this tender, provide the Engineer via the Principal Contractor with all Builder-provided work such as holes, machine bases, chases, recesses, service ducts, wooden sleeves and frames, etc., as herein identified being provided by others and which will be required to accommodate his services.

No structural element shall be erected and no holes shall be cut or made through the structure and no items of equipment shall be supported from the structure without the prior approval of the Structural Engineer or at least the Principal Contractor. Where foundations, machine bases, drained ducts, floor channels, cable sleeves, etc., have been identified herein to be provided by others, the contractor shall liaise and assist the Principal Contractor or others in setting out, locating, etc., of these items.

The contractor shall be responsible for the cost of all cutting, patching, making good, etc., as may be required to accommodate his work, due to late or wrong information been given by the contractor.

12. DRAWINGS

Any drawing which accompanies this specifications illustrates schematics and do not show exact dimensions or positions of equipment. Tenders must satisfy themselves that the

equipment offered by them shall fit in the available space and can be positioned so that access for maintenance, repair or removal is not encumbered.

Note: Final dimensions must be taken on site before any equipment or material is either purchased or manufactured.

13. SHOP DRAWINGS

Within 14 days of being awarded the contract the contractor will produce a complete layout in the form of a shop drawings with all the required service connections detailed and dimensioned. Any other shop drawings required to effect the installation shall be produced as required. At the end of the contract, three full sets of "as built" drawings and manuals shall be provided for this contract.

The successful tenderer shall before commencing manufacture of any of the equipment provide a dimensioned shop drawing for approval.

Approval of the contractor's drawings in no way indemnifies him from being responsible for the correctness of the drawings and satisfactory operation of the installations and for equipment.

14. MATERIALS, WORKMANSHIP AND EQUIPMENT OFFERED

Materials, workmanship and equipment offered shall be as specified and comply with the specification.

All material and equipment shall be new, free from rust, defects, undamaged and suitable for the purpose for which it will be used. Material shall comply with the latest issue of the relevant SANS specifications where applicable.

If any material or workmanship is not to the satisfaction of the Department, it shall be rectified and /or replaced at the contractor's cost and all rejected material shall immediately be removed from the site. The contractor is responsible for the correct and complete erection of the installation and inspections executed by the Department do not exempt the contractor of this obligation.

The term 'approved equal', as used herein, shall mean an item generally the same as the specified one, but of different manufacture. It shall meet all the specified parameters and approval for its use shall be obtained in writing from the Engineer.

15. STATUTORY AND REGULATORY REQUIREMENTS, DOCUMENTATION AND DRAWINGS

This supplementary specification is to be read as forming part of one or more Department of Public Works and Infrastructure Standard Specifications. The Department Standard Specifications for the Electrical Installations and Electrical Equipment pertaining to Mechanical Services shall also apply.

All equipment and installations shall comply with the requirements of the Occupational Health and Safety Act.

Where conditions are at variance this supplementary specification shall have preference over both the standards specifications and the drawings.

The Complete works shall comply in particular with the specifications and requirements of:

- SANS 1123: Pipe Flanges
- SANS 10400-O: Lighting and ventilation
- SANS 1044-S: Facilities for persons with disabilities
- SANS 10400-T: Fire protection
- SANS 10400-W: Fire installation
- SANS 10177: Fire testing of materials, components and elements used in buildings
- SANS 543: Fire hose reels (with semi-rigid hose)
- SANS 1128-1: Firefighting equipment: Components of underground and above-ground hydrant systems
- SANS1128-2: Firefighting equipment: Hose couplings, connectors and branch pipe and nozzle connections
- SANS 1464-22: Safety of luminaires: Luminaires for emergency lighting
- SANS 10139: Fire detection and alarm systems for buildings - System design, installation and servicing
- SANS 10252-1: Water supply to buildings
- SANS 460: Plain-ended solid drawn copper tubes for potable water
- SANS 10140-3: Identification colour marking: Contents of pipelines
- SANS 10400-A: General principles and requirements

- The Occupational Health and Safety Act, Act 85 of 1993, as amended.

This detailed specification and the drawings form part of the tender documents.

Deviation from this specification shall immediately be reported to the Engineer.

The works shall furthermore comply with all the requirements and bylaws of the relevant local authority. Where the proposed layouts, or any of the materials specified, etc., do not comply with these regulations, the matter shall immediately be brought to the attention of the Engineer.

Certificates of approval/ inspection from the local and/or statutory authorities shall be submitted to the Engineer before the final payment certificate will be issued.

The contractor shall furthermore issue all notices and pay all fees required to be given or paid in terms of statutory and regulatory requirements and the relevant local authority's bylaws.

16. SANS SPECIFICATION

All references to the South African National Standards and Codes of Practice shall be deemed to be references to the latest issues of such specifications and codes.

17. GUARANTEE AND MAINTENANCE

The tenderer shall guarantee equipment for a period of twelve months from the date on which the installation /fixing of all the units is satisfactorily completed.

The contractor shall repair, at his own cost, defects that may become defective during the guarantee period due to the inferior materials or workmanship (fair wear and tear excluded). Any part so replaced, shall be guaranteed for a further year from the date of replacement.

The contractor shall provide free maintenance for a period of 1 (one) year following the hand over to the client. The maintenance shall include for all management, labour, lubricating materials, cleaning materials and transport

18. COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS

Only specialists sub-contractors who have previously successfully completed mechanical installations of the extent and type specified in this document shall be considered.

Note: No change in make, type, or capacity of equipment specified in the schedule of particulars shall be allowed after acceptance of the tender without the written approval of the Department.

19. PERFORMANCE OF SYSTEMS AND EQUIPMENT

The systems and equipment layout designed by the Engineer shall conform to the requirements with regard to installation and system performance. This suggests that the performance of the equipment in the system supplied and installed by the contractor, shall be in accordance with the design and performance figures as published by the manufacturers and/or suppliers.

The efficiency of the design of the specified system is not the responsibility of the contractor. It is, however, the responsibility of the contractor to ensure that the quality of the workmanship and the installation of the equipment shall conform to the requirements of the Engineer and to the supplier/manufacturer.

It is furthermore accepted that the contractor has assured himself that all equipment supplied and installed under the contract shall perform within the given limits, as stated by the supplier/manufacturer, conforming to the specification.

20. PAINTING

All equipment, where required, shall be painted.

The colour of the materials and equipment shall be painted in accordance with SANS 10140: Identification colour markings Part 3: Contents of pipelines.

21. CORROSION PRECAUTIONS AND FINISHES

All materials such as brackets, hanger, etc., shall be shot-blasted, pre-painted, galvanised or treated against corrosion prior to their delivery to site. Any work that will require site cutting, etc., i.e. exposure of the bare steel to the atmosphere, shall immediately be treated by cold galvanising, painting, etc.

The method of treatment for the above shall depend on the particular environment and type of surface to be coated. The surface preparation, primer coats, finishing coats, etc. shall therefore be in accordance with those specified by reputable paint manufacturers.

All black steel piping, support brackets, hangers, etc., installed inside the building shall be treated with two coats of corrosion inhibitor paint prior to installation. The first coat shall be allowed to dry completely before the next coat is applied. A further coat of corrosion inhibitor shall be applied after installation and allowed to dry completely. Two coats of enamel paint, to the Architect or Engineer's specification, shall finally be applied. The first coat shall be allowed to dry completely before the next coat is applied.

All black steel piping, support brackets, hangers, etc., exposed to the weather shall be hot dipped galvanised.

All duct, supports, equipment and materials exposed to view (i.e. not in shafts, false ceiling, bulkheads, etc.) shall be cleaned, primed and then finished with two coats of enamel paint to the Architect or Engineer's specification. Each application shall be allowed to dry completely before the next coat is applied. The only exception to these stipulations shall be in the case of subcontracts, where the contractor shall only apply the primer coats and the Principal Contractor the finishing coats.

Colour coding shall follow the coding currently used on site. If no colour coding is in use, or in the case of new installations, the latest SANS 10140 Standards shall be used.

Plant and equipment, pre-painted or pre-primed at the factory shall be examined to ensure that the paint finishes are in a good condition. If not satisfactory, priming paint or finishing coats shall be removed where necessary, the surface cleaned to remove rust, and all such surfaces re-primed and finished in two coats of high quality paintwork to match the original.

The contractor shall fix black on white ivory labels to all items of equipment (machinery, fans, pumps, electric heater batteries, humidifiers, air handling units, etc.), as well as to all active valves (motorised and solenoid) and major isolating valves.

The labels shall be screwed or pop-riveted to the equipment and attached to the valves with steel cables. The lettering shall not be less than 10 mm in height and the wording shall be approved by the Engineer. The wording and tag numbers shall be the same as those used in this specification and indicated on the drawings.

22. DAMAGE

The tenderer will be held entirely responsible for any damage which may occur to equipment during the transportation, setting into position and fixing and must make good any such damage at his/her own risk.

No patching or repairing of damaged units will be allowed unless such damage can be completely effectively repaired and to the entire satisfactions of the Representative/Agent.

23. TUITION

The contractor shall provide capable instructor/s to train the client's personnel. These instructor/s shall be available for a total period of 1 (one) working day (eight hours) after the system has been commissioned and handed over to the client. The Operating and Maintenance Manuals shall be in possession of the client before the training commences.

24. TENDER SUBMISSIONS

Tender submissions shall conform strictly to the specification requirement. Tenders that are not in accordance with the specification will not be considered.

25. COMMISSIONING

Commissioning of the works shall form part of the Subcontract. Commissioning shall be meticulous and all procedures as stipulated by the suppliers of the equipment shall be strictly adhered to.

The contractor shall prepare detailed commissioning schedules well in advance of the programmed practical completion inspection date.

The schedules shall make allowance for all measurements that will be required, checking of operational and safety set-points, test results, etc., and shall be submitted to the Engineer for approval prior to the start of commissioning.

The contractor shall submit the completed schedules to the Engineer for checking after commissioning has been completed, and prior to the practical completion inspection.

The contractor is forewarned that the Engineer will under absolutely no circumstances deviate from the above procedure. The Engineer furthermore reserves the right to refuse to carry out the practical completion inspection until the contractor has complied with the above stipulations. The contractor shall accept this reserved right by the act of tendering.

Each task in these schedules shall be countersigned by the contractor's Commissioning Engineer to ensure that any discrepancies between site and commissioning conditions/data can be clarified.

All piping systems to be pressure tested to 1.5 times working pressure.

26. OPERATING AND MAINTENANCE MANUALS

Three sets of operating and maintenance manuals shall be prepared by the FC. These manuals shall be submitted to the Engineer for approval 1 week prior to the programmed date for the practical completion inspection.

Tenderers are to note that the said practical completion inspection shall not be carried out prior to the approval of these operating and maintenance manuals.

The manuals shall be properly bound and titled. Each set shall consist of 4 sections. Each section shall have the following sub sections:

Section 1: Operation

Introduction:

Short description of the complete system to familiarize laymen with the system lay out and operation.

Detailed description:

A detailed description of each system and its equipment, complete with schematic drawings. The purpose of this system is to explain the intended operation of each system and item of equipment to technical personnel. Detailed descriptions of the operation, set points, adjustments, etc., are thus to be included.

Section 2: Commissioning data

Schedules of data:

Detailed schedules of commissioning data of all the systems shall be included in this section for future reference. These schedules shall include, amongst others, water flow rates, major equipment, pressures, etc.

Section 3: Maintenance

Schedules:

This section shall contain detailed maintenance and service schedules for the complete installation.

Equipment details:

This section shall contain manufacturers' brochures, spare parts lists, etc., of all the items of equipment.

List of suppliers:

The list of suppliers (complete with addresses and telephone numbers) for each item of equipment shall be included in this section.

Section 4: Drawings

As built drawings:

A complete set of as built drawings shall be enclosed in this section.

27. FIRE CERTIFICATION

Once the installation is completed, and the fire engineer has signed off the installation, the FC shall arrange an inspection by the local fire department. The FC shall obtain a certificate by the local fire department, indicating the installation is approved by them. The certificate is to be submitted to the client, and one copy is to be submitted to the fire engineer.

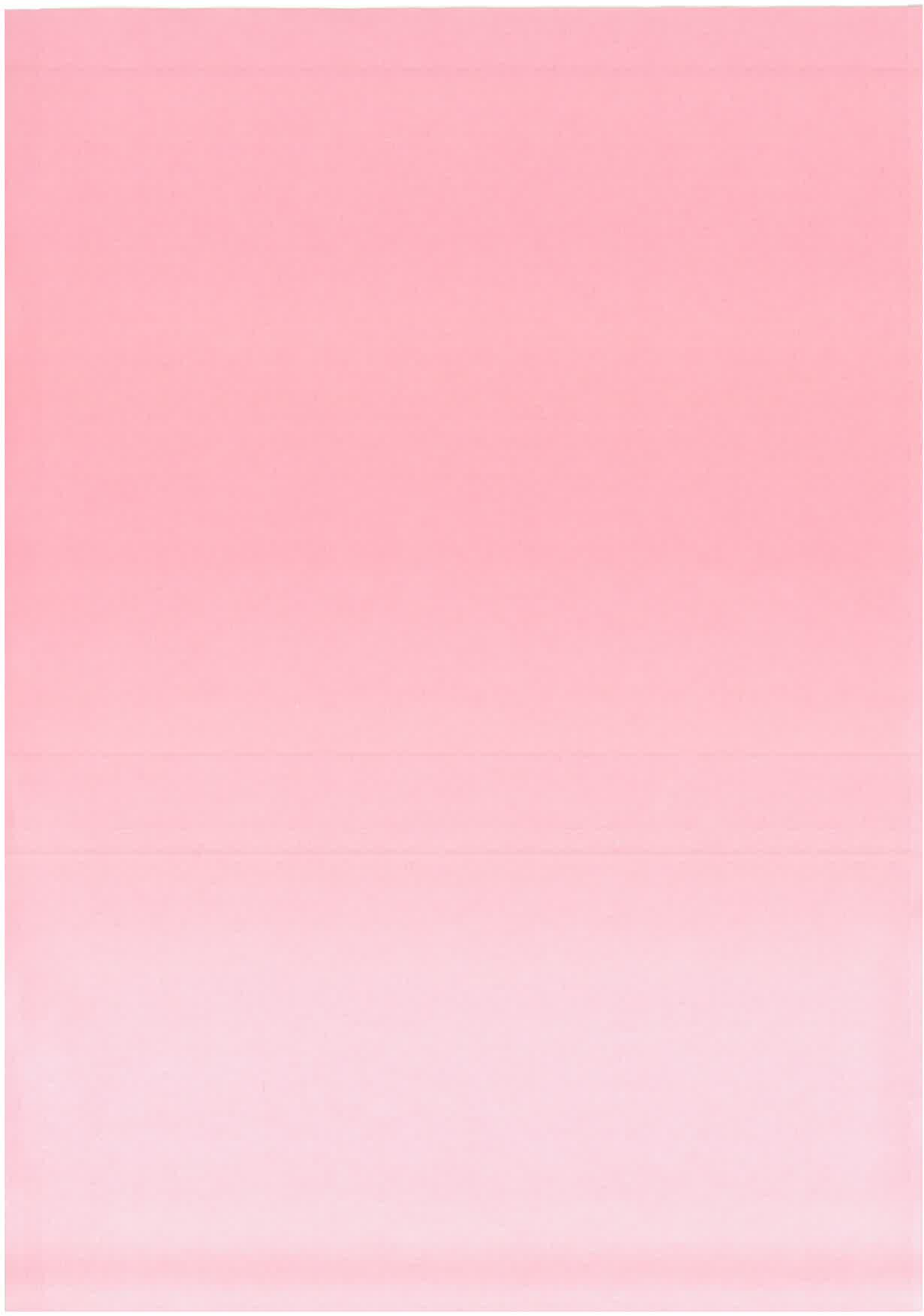
If the local fire department does not sign off the installation, the FC is to inform the fire engineer and client of the concerns of the fire department, so that these issues can be addressed.

28. DRAWINGS

The following drawings form part of this document:

No	Description	Drawing Number
1	Block A - Ground and first floor fire layout	2021-19-TTA-FIRE-A-DR-01
2	Block B - Ground and first floor fire layout	2021-19-TTA-FIRE-B-DR-01
3	Block C and G - Ground and first floor fire layout	2021-19-TTA-FIRE-CG-DR-01

4	Block D - Ground and first floor fire layout	2021-19-TTA-FIRE-D-DR-01
5	Block E - Ground and first floor fire layout	2021-19-TTA-FIRE-E-DR-01
6	Block F - Ground and first floor fire layout	2021-19-TTA-FIRE-F-DR-01
7	Kitchen, Mess Hall, Main Hall and Boardroom – Ground fire layout	2021-19-TTA-FIRE-KH-DR-01
8	Site Plan: Fire layout	2021-19-TTA-FIRE-SITE-DR-01
9	Site: Fire water calculations	2021-19-TTA-FIRE-SITE-CALC-01
10	Block B server room and Block G office fire gas suppression layout	2021-19-TTA-FGS-DR-01





public works
& infrastructure
Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

NATIONAL DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE

TECHNICAL SPECIFICATIONS HVAC SERVICES

THABONG SAPS – TRAINING ACADEMY

TABLE OF CONTENTS

A. GENERAL	16
1. SCOPE OF WORKS	16
2. GENERAL	16
3. MATERIAL AND WORKMANSHIP	17
4. DRAWINGS.....	17
5. COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS	18
6. MANUFACTURER'S RATINGS.....	18
7. SHOP DRAWINGS.....	18
8. AS-BUILT DRAWINGS.....	19
8.1. Maintenance	19
8.2. Operating and Maintenance Manuals.....	19
9. BUILDING WORK	21
10. SITE INSPECTION	21
11. DETAILS OF MAINTENANCE WORK	21
12. GUARANTEE.....	21
13. SANS SPECIFICATION.....	22
14. INSTRUCTIONS MANUALS SIMILAR OR EQUAL.....	22
15. SIMILAR OR EQUAL	22
16. SPARE PARTS.....	22
17. DAMAGE	22
B. PARTICULAR TECHNICAL SPECIFICATIONS FOR THE SUPPLY, DELIVERY, AND INSTALLATION OF HVAC EQUIPMENT.	23

1. SITE	23
2. MECHANICAL HVAC SERVICES WORKS	23
3. WORK, PLANT, EQUIPMENT AND SERVICES ETC. EXCLUDED	23
4. WORK, PLANT, EQUIPMENT AND SERVICES ETC. INCLUDED.....	24
5. RELATED WORKS BY MECHANICAL HVAC CONTRACTOR.....	24
6. GENERAL DESCRIPTION AND REQUIREMENTS: HVAC SYSTEM.....	25
7. SPLIT TYPE UNITS	25
7.1. General.....	25
7.2. Technical Specifications for Air Conditioners	26
8. REFRIGERANT CIRCUITS	28
9. VENTILATION.....	29
9.1. Ventilation.....	30
9.2. Passive Ventilation	30
9.3. Extraction.....	31
9.4. Kitchen Extraction.....	31
10. AIR FILTERS	32
10.1. General.....	32
10.2. Panel Filters.....	32
10.3. Pad Type Panel Filters.....	33
10.4. Filters Holding Frames	33
11. INSULATION	33
12. DUCTING AND ASSOCIATED FITTINGS	34
12.1. Duct Insulation.....	34
12.2. Flexible Connections	35
12.3. Flexible Ducts	35

13.	FANS	36
14.	NOISE AND VIBRATION CONTROL	38
15.	SECOND FIX (AIR FITTINGS).....	39
15.1.	Conditioned Supply Air Diffusers	39
15.2.	Fresh Air Supply Grilles	39
15.3.	Return Air Grilles	39
15.4.	Air Transfer Grilles/Door Grilles	39
15.5.	Extract Air-Valves	39
15.6.	Louvres.....	40
16.	COLD ROOM AND FREEZER ROOMS.....	40
16.1.	General.....	40
16.2.	Walls and Roofs.....	44
17.	HUMIDIFICATION	47
18.	CONDENSATE DRAINS.....	48
19.	FIXING OF EQUIPMENT	48
20.	Commissioning Requirements	49
21.	ASSOCIATED ELECTRICAL WORK	50
22.	MAINTENANCE AND SERVICING	50
23.	SCHEDULES OF PARTICULARS	51
24.	DRAWINGS.....	52

A. GENERAL

1. SCOPE OF WORKS

This particular Technical Specification is for the supply and installation of the HVAC services at the Thabong SAPS Training Academy. The specification covers installations of split units, toilet extraction, fresh air, humidifiers, cold room and freezer room.

The HVAC layout drawing accompanies this Specification.

The equipment to be installed and serviced under this contract includes the following systems and equipment:

- Mid-wall type air conditioning unit
- Underceiling type air conditioning unit
- Mechanical fresh air
- Mechanical extraction
- Dehumidification
- Cold room and freezer room

All electrical and drain piping connections for the complete air conditioning units to be installed.

Commissioning and testing of all the HVAC equipment, controls, equipment supports etc. and the handover of a complete operational installation.

2. GENERAL

This supplementary specification is to be read as forming part of one or more Department of Public Works and Infrastructure Standard Specifications. The Department Standard Specifications for the Electrical Installations and Electrical Equipment pertaining to Mechanical Services shall also apply.

All equipment and installations shall comply with the requirements of the Occupational Health and Safety Act.

Where conditions are at variance this supplementary specification shall have preference over both the standards specifications and the drawings.

The installation shall be erected in compliance to the following standards and regulations:

- SANS 10400-O: Lighting and Ventilation
- SANS 1238 - Air conditioning duct work
- SANS 1424 - Filters for use in air conditioning and general ventilation
- SANS 1287: 1 - Ventilation brattices and ducting: Flexible ducting
- SANS 1287: 2 - Ventilation brattices and ducting: Brattices, unsupported
- SANS 1424 - Filters for use in air-conditioning and general ventilation
- SANS 10147 - Refrigerating systems, including plants associated with air-conditioning systems
- SANS 10173 - The installation, testing and balancing of air conditioning duct work
- SANS 1125 - Room air conditioning and heat pumps
- SANS 10103 - The measurement of rating of environmental noise with respect to annoyance and to speech communication
- SANS 193 - Fire dampers
- SANS 10400: XA - Energy usage on buildings
- SANS 204 - Energy efficiency in buildings
- SANS 460 - Plain-ended solid drawn copper tubes for potable water
- The Occupational Health and Safety Act 85 of 1993
- PW325 – Manual for Electrical and Mechanical Consulting Engineers

3. MATERIAL AND WORKMANSHIP

All material and equipment shall be new, free from rust, defects, undamaged and suitable for the purpose for which it will be used. Material shall comply with the latest issue of the relevant SANS specifications where applicable.

If any material or workmanship is not to the satisfaction of the Department, it shall be rectified and /or replaced at the contractor's cost and all rejected material shall immediately be removed from the site. The contractor is responsible for the correct and complete erection of the installation and inspections executed by the Department do not exempt the contractor of this obligation.

4. DRAWINGS

Any drawing which accompanies this specifications illustrates schematics and do not show exact dimensions or positions of equipment. Tenders must satisfy themselves that the

equipment offered by them shall fit in the available space and can be positioned so that access for maintenance, repair or removal is not encumbered.

Note: Final dimensions must be taken on site before any equipment or material is either purchased or manufactured.

5. COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS

Only specialists sub-contractors who have previously successfully completed mechanical installations of the extent and type specified in this document shall be considered.

Note: No change in make, type, or capacity of equipment specified in the schedule of particulars shall be allowed after acceptance of the tender without the written approval of the Department.

6. MANUFACTURER'S RATINGS

All equipment shall be able to work within the rated capacity, as determined by the manufacturer. Any equipment offered for the use out of these limits shall not be considered. Contractors shall hand in the rated capacities of all equipment as well as descriptive literature with the tender documents.

7. SHOP DRAWINGS

Within 14 days of being awarded the contract the contractor will produce a complete layout in the form of a shop drawings with all the required service connections detailed and dimensioned. Any other shop drawings required to effect the installation shall be produced as required. At the end of the contract, three full sets of "as built" drawings and manuals shall be provided for this contract.

The successful tenderer shall before commencing manufacture of any of the equipment provide a dimensioned shop drawing for approval.

Approval of the contractor's drawings in no way indemnifies him from being responsible for the correctness of the drawings and satisfactory operation of the installations and for equipment.

8. As-Built Drawings

As-built drawings shall be prepared by the Subcontractor. These drawings shall be submitted to the Engineer for approval 1 week prior to the programmed date for the practical completion inspection of the last section of the works.

8.1. Maintenance

The Subcontractor shall prepare detailed weekly, monthly, 6-monthly and annual maintenance and service schedules, as required, for the complete works. These schedules shall be included in the Operating & Maintenance Manuals and will be submitted to the Engineer for approval.

The tenderers shall allow for four (4), equally spaced, service visits to be carried out during the warranty period. A detailed service report together with a copy of the completed maintenance and service schedules shall be passed on to the Engineer on completion of each service visit.

The HVAC contractor shall provide a logbook, which shall be stored in an approved location on site. A short description and any relevant comments relating to the service visits or defect repairs, and all pressures, power draws etc., to be logged, shall be noted in the logbook at the end of each visit.

Each entry shall be signed and dated by the serviceman, as well as counter signed by the Employers representative. A new logbook shall be provided by the HVAC contractor when required and the old book passed on to the Employer via the Engineer.

8.2. Operating and Maintenance Manuals

Three sets of operating and maintenance manuals shall be prepared by the Subcontractor. These manuals shall be submitted to the Engineer for approval 1 week prior to the programmed date for the practical completion inspection.

Tenderers are to note that the said practical completion inspection shall not be carried out prior to the approval of these operating and maintenance manuals.

The manuals shall be properly bound and titled. Each set shall consist of 4 sections. Each section shall have the following sub-sections:

Section 1 - Operation

Introduction:

Short description of the complete system to familiarise laymen with the system lay-out and operation.

Detailed description:

A detailed description of each system and its equipment, complete with schematic drawings. The purpose of this system is to explain the intended operation of each system and item of equipment to technical personnel. Detailed descriptions of the operation, set-points, adjustments, etc., are thus to be included.

Section 2 - Commissioning data

Schedules of data:

Detailed schedules of commissioning data of all the systems shall be included in this section for future reference. These schedules shall include, amongst others, air flow rates, major equipment power draws, pressure drops, etc.

Section 3 - Maintenance

Schedules:

This section shall contain detailed maintenance and service schedules for the complete installation.

Equipment details:

This section shall contain manufacturers' brochures, spare parts lists, etc., of all the items of equipment.

List of suppliers:

The list of suppliers (complete with addresses and telephone numbers) for each item of equipment shall be included in this section.

Section 4 - Drawings

As-built drawings:

A complete set of as-built drawings shall be enclosed in this section.

In addition to the above, one operating and maintenance instruction booklet per air-conditioning unit installed shall be provided by the subcontractor prior to the practical completion inspection. It is to be noted that under no conditions will the practical completion

inspections be carried out unless these instruction booklets have been handed over to the Engineer.

It shall be the subcontractor's responsibility to advise the air-conditioning units' suppliers of this requirement at tender stage and to ensure that any associated costs are allowed for in the tendered subcontract sum.

9. BUILDING WORK

All building work to be done by the building contractor as shown on the mechanical shop drawings. All other small building work such as cutting and drilling of holes forms part of this contract.

10. SITE INSPECTION

Tenderers are advised to visit the site to acquaint themselves with the local conditions, accessibility, etc. No claims for compensations due to lack of knowledge of conditions will be accepted.

11. DETAILS OF MAINTENANCE WORK

The contractor shall be responsible for the complete maintenance of all the equipment, components, installations and systems forming part of this installation for 12 months.

12. GUARANTEE

The tenderer shall guarantee equipment for a period of twelve months from the date on which the installation /fixing of all the units is satisfactorily completed.

The contractor shall repair, at his own cost, defects that may become defective during the guarantee period due to the inferior materials or workmanship (fair wear and tear excluded). Any part so replaced, shall be guaranteed for a further year from the date of replacement.

13. SANS SPECIFICATION

All references to the South African National Standards and Codes of Practice shall be deemed to be references to the latest issues of such specifications and codes.

14. INSTRUCTIONS MANUALS SIMILAR OR EQUAL

A maintenance and operation instruction manual, including spare parts list shall be provided with each mechanical and electrical unit.

15. SIMILAR OR EQUAL

Any trade name mentioned merely serves as a guideline and does not indicate preference for that specific make. Tenderers are at liberty to offer any other equipment and /or material, which comply with the specification requirements.

16. SPARE PARTS

Spare parts for each mechanical and electrical appliance shall be readily available in the Republic of South Africa, for a minimum period of 10 years.

17. DAMAGE

The tenderer will be held entirely responsible for any damage which may occur to equipment during the transportation, setting into position and fixing and must make good any such damage at his/her own risk.

No patching or repairing of damaged units will be allowed unless such damage can be completely effectively repaired and to the entire satisfactions of the Representative/Agent.

B. PARTICULAR TECHNICAL SPECIFICATIONS FOR THE SUPPLY, DELIVERY, AND INSTALLATION OF HVAC EQUIPMENT.

1. SITE

The Thabong SAPS Training Academy is located on 8004/1 Modikeng Road, Thabong, Welkom, Free State.

2. MECHANICAL HVAC SERVICES WORKS

Unless otherwise indicated, the Mechanical HVAC Services Works are to include the design development/coordination, supply, delivery, receiving, off-loading, handling, storing, installation, placement positioning, safety, assembling, erection of equipment, testing, commissioning, demonstration and handover of all Mechanical HVAC Services systems and associated works specified and/or shown on the drawings.

3. WORK, PLANT, EQUIPMENT AND SERVICES ETC. EXCLUDED

The items of plant, equipment and work listed hereunder are specifically excluded from the scope of the HVAC contractor's obligations

The tenderer shall however furnish full details in the tender data sheets of any further items of equipment, material and work not provided for in its tender

List of exclusions

- Power supply from the isolator to the DB board
- Earthing of equipment
- Civil Plinths for the plant
- Service ducts
- Openings for HVAC equipment
- Making good once equipment has been installed through walls
- Temporary power and water to site establishment (supplied by main contractor)

All items of plant, equipment and work not listed above and in the tender data sheets as being excluded, shall be deemed to be included in the tender and / or contract prices.

4. WORK, PLANT, EQUIPMENT AND SERVICES ETC. INCLUDED

This Specification provides and includes for;

- The design, manufacture, inspection, testing, supply, packing, forwarding and delivery of plant, equipment and materials to the site, including the payment of all freight, insurance, import, customs, excise and other duties, levies, forwarding, railage and all other transportation and delivery charges
- The furnishing of "know-how", for the successful operation/functioning of the plant/equipment/process
- Drawings of the equipment i.e. HVAC plant, Laminar flow hoods, etc. These shall be submitted for approval prior to manufacture
- Management of manufacturing and delivery of components of Air conditioning, extraction, ventilation systems and cold room cooling equipment
- Interface with main building contractor, electrical, fire and wet's contractor during commissioning
- The supply and delivery of commissioning spares
- The supervision of and responsibility for the commissioning including preliminary trials, final testing, starting, setting to work, proving and handing over to Client of all plant, equipment and materials in full working order under the stated operating conditions and complying with the performance and other guarantees specified
- The supply of all specified operating, training and maintenance information including complete parts data, parts manuals (if applicable) and drawings as specified
- The remedy of the plant and equipment during the "Defects Liability Period"
- The supply of all services, information and data
- Any other items not covered by the foregoing, but forming part of the contractor's obligations and responsibilities

5. RELATED WORKS BY MECHANICAL HVAC CONTRACTOR

- Core drill services penetrations 100mm diameter and smaller.
- Weather seal mechanical services works penetrations.
- Seal mechanical services works penetrations to prevent air leakage.

- Seal mechanical services works penetrations to prevent noise transfer.
- Provide items, accessories or apparatus which may not have been specifically mentioned but which are usual or necessary for the fabrication, handling during installation, or to achieve and maintain the performance requirements and safe operation.
- Provide secondary and tertiary steelwork, supports and hangers including final builders work design and detailing, member sizing, calculations, connection detailing and suchlike.

6. GENERAL DESCRIPTION AND REQUIREMENTS: HVAC SYSTEM

The General Description must be read in conjunction with the bill of quantity and data sheets.

A summary of the systems at the site is listed below:

- Mid-wall DX split units
- Underceiling DX split unit
- Fresh air fans and ducting
- Extraction air fans and ducting
- Cold room and Freezer room (Condenser, blower, door and insulation)

7. SPLIT TYPE UNITS

7.1. General

The air conditioning units shall be completely self-contained units of the direct expansion unitary or split type system. Room air side shall be equipped with a suitable and easily accessible filter, at least two adjustable fan speed, adjustable air discharge louvre, thermostat, heating and cooling modes with associated heating and cooling coils, drain pan and drain piping, control panel (Hard-wired) and interlocking with outdoor unit.

The indoor unit shall be wall mounted or ceiling cassette type as specified in the drawings.

The outdoor unit shall contain the notching compressor unit, air-cooled condenser, condenser fan with waterproof, painted and corrosion resistant casing. Outdoor units shall be installed and fixed on raised plinths or mounted steel frame, brackets. Anti-vibration mounts shall be installed between the unit and the plinth/frame/bracket.

The air conditioners shall be in accordance with SANS 1125 with sound levels not exceeding the values specified in SANS 10103.

The indoor/outdoor units shall be interconnected with insulated refrigerant piping, electric wiring and interlocking control cabling. Refrigerant piping and cabling, where exposed to weather and can potentially damage any part of installation, shall be run through galvanized sheet metal trunking or PVC type trunking, neatly erected and painted. Refrigerant piping shall be sized and fitted with the necessary oil traps strictly in accordance with the manufacturer's requirements.

Provision shall be made in all cases for the drainage of excessive condensate to the nearest building drain by means of uPVC/PVC tubing not less than 20mm diameter.

For reverse cycle heating units, including split type units, a proper drip pan with drainage piping by means of uPVC/PVS shall be provided for the outdoor units where dripping can create unacceptable conditions.

Drainage to points other than a building drain shall comply with SANS 10400:P.

Electrical interlocking shall be provided to ensure that:

- Compressors cannot run without both indoor and outdoor fans running.
- Electric heating can only be switched on if the indoor fan is running.
- It shall not be possible to switch cooling and heating on simultaneously.

Electric terminals and connections shall be corrosion resistant with non-hardening mastic or equal coating. Overload protection shall be provided.

Remote control shall be wired in conduit and mounted at eye level in the position indicated on the drawings and approved by the architect. No joints will be allowed in the control wiring.

Any tests and measurements which may be performed or required shall be recorded and made available to the Department engineer upon request. Any equipment make shall be approved by the Department prior to installation.

General arrangement and configuration required is indicated on the drawings.

7.2. Technical Specifications for Air Conditioners

Scope:

The supply, installation as per scope given below, testing and commissioning the following air conditioning units:

Location	Area (m ²)	Unit Type	Unit Size (KW)	Number of Units
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Office: A1-22	13,0	Mid-wall	2,6	1
Main Hall: H1-1	208,0	Under-ceiling	16,1	3
Boardroom: J1-1	91,0	Mid-wall	7,0	2
Mess Hall: M1-1	147,0	Under-ceiling	16,1	2
Server Room: B1-10	6,0	Mid-wall	2,6	2
Server Room: B1-10	6,0	Mid-wall	2,6	2
Library: G1-1	183,0	Under-ceiling	16,1	3
Office: G1-2	21,0	Mid-wall	3,5	2
Office: K1-2	14,0	Mid-wall	3,5	1

Features:

- Auto restart
- Dust filter
- Swing mode
- Fan mode
- Timer
- Air swing
- Anticorrosive coating on condenser coil

Successful tenders shall bring all tools and tackles required for installation, testing & commissioning and servicing of air conditioner units.

Down rods with all accessories like washer, bolts etc. for mounting indoor unit of air conditioners shall be supplied and installed by the successful tenderer.

Hangers required for routing the drain pipe, refrigerant piping and control or power cables from indoor unit to outdoor unit shall be supplied by the successful tenderer.

All drilling works required for successful installation of air conditioner units shall be done by the successful tenderer.

Mounting brackets required for installing outdoor unit and indoor unit shall be supplied by the successful tenderer.

Gas charging if required shall be done at the site at free of cost for successful commissioning.

Installation of the air conditioners shall be carried out using proper tools and procedures as per manufacturer guide lines. Operation and Maintenance manuals shall be supplied for each set of air conditioner.

Acceptance shall be based on the testing, performance and satisfactory working of air conditioners.

Testing to be done after Installation:

- Compressor current and cooling temperature shall be tested
- Air conditioners will be switched ON and cooling effect will be checked
- Air conditioners will be switched ON/OFF 10 times in one hour following recommended procedures.
- Water drain shall be checked by flowing water.
- Remote operation checking.

8. REFRIGERANT CIRCUITS

The condensing units shall be connected with refrigerant pipes to their respective indoor units as indicated on the drawings. The pipe work design shall comply with the manufacturer's specification in terms of piping sizes, refnets joints, design philosophy and distribution for proper refrigerant flow, so as not to compromise the capacity or functioning of the individual air-conditioning indoor unit.

Refrigerant tubing shall generally be in accordance with the latest SANS 1453 sizes of copper tubes. The tubing shall be seamless cold drawn copper tubing with soldered copper capillary fittings. Pipe sizes shall ensure moderate low velocities flow through the pipes while ensuring:

- Proper oil return to the compressor minimising lubricating oil being trapped in the system.
- Practical lines without excessive pressure drops and with proper feed of evaporators.
- Prevention of liquid refrigerant from entering the compressor during operation and at shutdown.

Piping shall be supported (unless otherwise indicated on the drawings) as follows:

Pipe size (mm)	Maximum distance between supports (m)
10 and smaller	0.6
10 – 18	1.0

22	1.5
28 – 35	2.0
42	2.5
54	2.75
67 and bigger	3.0

Refrigerant piping shall be arranged such that normal inspection and servicing of the compressor and other equipment is not hindered. Locations where copper tubing will be exposed to mechanical damage shall be avoided.

Anti-vibration mounts shall be fitted at compressor discharge and suction connections.

Oil separators shall be used in systems where it is impossible to prevent substantial absorption of refrigerant in the crankcase oil during normal operation or during shutdown periods. Provision shall be made to prevent drainage of condensed refrigerant into the crankcase.

All pipes operating below ambient point shall be insulated and vapour barrier provided.

All refrigerant pipes to be covered with a trunking to prevent the insulation from UV rays.

All piping circuits shall be tested to a pressure of at least 1,5x times working pressure for a duration of 1 hour. No static pressure loss shall be acceptable during the test period.

All pressure tests shall be witnessed and certified by the Engineer.

9. Ventilation

Ventilation is being supplied to the building by way of a ducted fresh air system in line with SANS 10400: O requirements.

Ventilation is being supplied to the occupied areas of the building.

The ventilation system is to be linked with a timers and sensors so that fresh air is supplied and extracted when the building is in use during working hours. The position of the fresh air and extractions system and ducting routing is shown on the drawings. This can be adjusted once approved by the engineer.

9.1. Ventilation

Ventilation is being supplied by way of a ducted system. The components of these systems are a weather louvre, filter box, sound attenuators, axial fan and ducting with balancing dampers.

The sizes indicated on the drawings are the internal openings of louvers. An additional 50mm must be allowed for the builder's work penetration. The flange of the louver must overlap the wall.

Ducting of the facility will be 0.8 mm galvanised sheet steel. The sizes indicated on the drawing are the internal dimensions required for the system. The ducting must be connected by 25mm flange around the perimeter, a double-sided tape between flanges and bolted in the corners. There should also be a clamp on the long sections of flanges.

The supporting detail for the ducting must be proposed once the slab is in place and area for the path of the duct can be confirmed. Ducting that runs through walls must be marked up on site and confirmed with structural engineer before penetration is made.

Round ducting will be spiral type.

The sound attenuators will be designed to an NC 35 rating.

Axial fans will supply the fresh air into the building. Fans will be sent to for approval with the process requirement supplied by the Engineer. Fans will be mounted on anti-vibration mounts on the positions marked on drawings. Control of these fans is to be interlocked with the air-conditioning system.

Filter box will be supplied to filtrate the air before it is supplied into the building. The primary and secondary filters must be washable pleated type filters. The box design must be sent through for approval before manufacture.

9.2. Passive Ventilation

Passive ventilation is the allowance for make-up air in areas where there is extraction. The passive systems are usually by way of a door grille. Door grilles like louvers should be allowed to be epoxy powder coated to architect's specification.

9.3. Extraction

Extraction is by way of a ducted system and a wall mounted extraction fan . Extraction will be provided to the ablutions and kitchen.

Ducted systems are exactly the same as described above. The exception is that there is no filter box and diffusers for this installation. Appropriate extract air grilles or disk valves are to be used.

Extraction fan will be interlocked with a sensor or contain a timer in the DB.

9.4. Kitchen Extraction

Exhaust/extract canopies shall be manufactured from high quality brushed stainless steel. The canopies shall be complete with suitable, approved, sealed type light fittings. Light fittings shall be fit for the application and shall be flush mounted. Lights shall be serviced from below. The fan for each canopy shall be provided with a speed control. The light fittings in each canopy shall be interlocked with the light fittings of the relevant room.

Kitchen canopies shall be installed where indicated. Kitchen canopies (hoods) shall be supplied by a specialist in the field in accordance with SANS 1850 and shall be complete with:

- Grease filters
- Drip trays & gutters
- Light fittings
- Manufactured from 316 or 304 stainless steel, brushed finish
- Supports

The exhaust fan for the canopies shall be provided with a speed control.

On/off switches for the lights and fan as well as speed control shall be provided on the kitchen DB by the HVAC contractor.

Ventilation fans shall be suitable for the application, i.e. the kitchen canopy exhaust fan shall be spark proof and rated for high temperature duty. Smoke ventilation fans shall be suitable for prolonged operation at elevated temperatures. Fans shall be uniquely numbered and applicable, original certificates shall be submitted for each special application.

Fans shall be uniquely numbered and applicable, original certificates shall be submitted for each special application.

The ducting for the extract kitchen canopy shall be of welded sheet metal construction with a minimum thickness of 1mm.

10. AIR FILTERS

10.1. General

Filters of the type, size and quantity as specified in the technical details of the units shall be provided. Replacement of filters may be done only with filters matching the existing. Change of type or introduction of new filters in the system to meet requirements as set out in the standards specification and this specification.

Filters and filter holding frames shall be of approved manufacture with standardised dimensions to enable replacement with equivalent filters of all recognised manufacturers. Construction and manufacture of all components shall be such that under no circumstances any unfiltered air can by-pass filters or filter banks.

Sufficient space shall be allowed in front or behind filters, as applicable, to enable inspection and servicing. Proper access doors shall be fitted to filter service areas.

Fan and system selection shall allow for expected final filter resistance to ensure a supply air quantity in excess of 90% of design air quantity immediately prior to filter replacement.

Only dry media filters are required. Where specified, pressure monitoring across a filter bank or banks shall be fitted for alarm purposes using differential pressure switches to activate the warning alarm or indicator required. Where washable filters are specified one complete set of spare filters shall be provided.

10.2. Panel Filters

Panel filters shall be of the pleated type and not less than 50mm thick. The filter shall be washable or disposable as specified.

Synthetic media shall be used bounded together with galvanised wire for reinforcing and bonded in the frame ensuring no air bypass.

Initial synthetic dust arrestance shall be not less than 70% with dust holding capacity needed in excess of 300g per square metre nominal face area.

Initial dust spot efficiency shall be not less than 20%.

Nominal filter face velocity shall not exceed 1,5m/s with initial clean filter resistance 60Pa or less and recommended resistance at specified arresstance not more than 250Pa.

10.3. Pad Type Panel Filters

Pad type panel filters shall make use of disposable replacement media of thickness as specified by air conditioning unit manufacturers, but generally not less than 25mm thick.

The media shall be held in galvanised steel frames with galvanised steel screen supports on both sides. The downstream screen shall be fixed in the frame with the upstream screen removable.

10.4. Filters Holding Frames

Filter holding frames shall be to the manufacturer's standard product installation and used in accordance with his recommendations.

Holding frames shall be manufactured from at least 16 gauge galvanised or epoxy powder coated steel. Holding frames may be bolted or riveted together and shall be suitably reinforced in larger arrangements to withstand all possible operating conditions.

Fasteners shall be positive sealing type that clip in and a minimum of four fasteners per filter is required. Fasteners shall match the particular filter, filter arrangement and frame.

11. INSULATION

Insulation shall in all instances be applied by specialist contractors and be of the highest standard. Any section not installed to the approval of the Department shall be re-done at the Contractor's expense.

Prior to insulation being fitted, all pressure testing shall be completed satisfactorily. Insulation, cladding and vapour barriers shall be painted as specified.

All items of plant likely to operate at temperatures below the surrounding ambient dew point shall be insulated and provided with a vapour barrier.

Insulated pipe work penetrating through masonry or concrete elements shall have its insulation extended right through the penetration to ensure the vapour proof integrity of the insulation. All penetrations shall be sealed and caulked to approval by the HVAC contractor.

12. DUCTING AND ASSOCIATED FITTINGS

The ducting route marked up on drawings is to be confirmed on site as there is limited space in the ceiling void and roof trusses may require the ducting to be routed around it. The ducting will be 0.8 mm thick.

The ducts shall be manufactured from galvanised sheet metal in accordance with the specifications and requirements for low pressure ducts as per SANS 10147 and 1238, as amended, and shall be installed, balanced and tested as per SANS 10173, as amended.

Where changes in the duct sizes indicated on the Engineers drawings are required, due to particular site conditions or requirements, the new sizes shall be determined using equivalent hydraulic diameters and not cross-sectional areas. Rectangular duct aspect ratios in excess of 4:1 shall not be allowed. The minimum internal rectangular duct dimension for low and medium velocity ducting shall be 150 mm.

All hangers, brackets and other duct supports required for the installation of the ducts shall be manufactured from galvanised mild steel. Where the galvanised finish is damaged by cutting, drilling, etc., it shall immediately be painted with cold galvanising.

All external ducts shall be joined by means of transverse flanged duct joints. Flanged joints shall be sealed by means of a gasket or non-hardening mastic sealant applied between the flanges.

Internal ducts may be joined by means of transverse flanged duct joints, such as the slip (S and Drive) type joints. All internal duct joints shall be sealed with non-hardening mastic sealant, gaskets or external tape.

The top surfaces of external ducts shall be sloped to ensure water runoff. Under no circumstances shall water be allowed to pool on top of the ducts, especially at the flanges.

The ducting for the extract kitchen canopy shall be of welded sheet metal construction with a minimum thickness of 1mm.

12.1. Duct Insulation

Duct insulation shall be in accordance with SANS 0173, as amended.

All conditioned supply air ducting shall be flanged and externally insulated with 25 mm thick thermal insulation, complete with aluminium foil vapour barrier (FRK). The insulation shall be

fixed over its full area with adhesive suitable for bonding between fibreglass blanketing and galvanised sheet metal and shall, in addition, be mechanically secured at maximum intervals of 400 mm with nylon strapping, or by means of spot welded pins with securing washers/heads of diameter not less than 30 mm.

All return air ducts associated with the ducted hide-away type air-conditioning systems shall be flanged and externally insulated with 25 mm thick thermal. The insulation shall be fixed over its full area with adhesive suitable for bonding between fibreglass blanketing and galvanised sheet metal and shall, in addition, be mechanically secured at maximum intervals of 400 mm in any one direction by means of spot welded pins with securing washers/heads of diameter not less than 30 mm.

Tenderers are to note that the one exception to the above occurs where the supply and return air ducting is exposed as part of the final finish, no insulation shall be required.

12.2. Flexible Connections

Flexible connections shall be provided at the junctions between all fans, attenuators, air-conditioning units or other vibration inducing equipment and ducts.

The flexible connections shall be manufactured from non-combustible material approved by the local authorities, and shall be complete with bolted flanges to join the two component sections. Care shall be taken in the mounting and support of the ducts joined by flexible connections to ensure that no strain is placed on the material during static and dynamic operating conditions.

External flexible connections shall be protected from direct sunlight with galvanised sheet metal cover strips.

Flexible connections to ducting conveying conditioned air shall be externally insulated with 25 mm thick thermal insulation, complete with aluminium foil vapour barrier (FRK). The insulation shall be mechanically secured at maximum intervals of 200 mm to the adjoining ducting by means of spot welded pins with securing washers/heads of diameter not less than 30 mm.

12.3. Flexible Ducts

Flexible round ducts shall only be used for connecting diffusers and grilles to the supply, return and extract air ducts.

Flexible ducts shall be factory manufactured from non-combustible, wire reinforced, aluminium material, acceptable or approved by the relevant local authorities. Each flexible duct section shall have a maximum length of 1.5 m and be used only in straight connections-no bends are permitted due to distortion that happens on the bends. Flexible ducts shall be joined to the sheet metal duct and diffusers with suitable clamps and duct sealant.

Flexible ducts conveying conditioned air shall be of the insulated type.

13. FANS

Only good quality fans, from recognised manufacturers and suppliers with established local representation, and of the types as specified hereafter, shall be acceptable.

Alternative types of fans, suitable for the application and with noise level within limits and dimensions to suit the allocated equipment spaces, may be offered to provide the most economical solution.

The fans offered shall nevertheless meet the specified air flow rates at the indicated system resistance. Fan efficiencies shall under no circumstances be less than 60 %.

Tenderers are to note that the fan total/static pressures indicated in the schedules on the drawings are to be used as a guideline at tender stage only.

The required pressures are to be re-calculated by the Subcontractor to allow for the equipment, as well as any modifications to the duct sizes and routes, etc., offered by the Subcontractor. If the Subcontractor is unable to calculate the new system resistance, the Engineer will do so, and provided all the required information is made available by the Subcontractor. It shall nevertheless be the subcontractor's responsibility to ensure that the system resistance of the new/altered duct layout is calculated and allowed for.

Prior to placing orders, the Subcontractor shall submit fan ordering advice schedules to the Engineer for approval. These schedules shall be in an approved format, showing the specified parameters as well as the parameters of the equipment that the Subcontractor intends to order. Performance curve graphs, showing the operating points of the selected fans shall accompany the ordering advice schedules.

Equal function fans shall be of the same type. Similar type fans shall be of the same make. Casings, cowls, etc. shall be in galvanised sheet metal of suitable thicknesses (industrial application).

Fans with motors larger than 1 kW shall be internally sprung within their casings, or shall be fitted with anti-vibration mountings. Axial fan motors shall be sized for fan blade angles 3° greater than that required at the specified fan duty point.

The fans and their associated equipment offered shall meet the sound levels specified herein. Tenderers or their suppliers shall calculate the noise levels generated by the offered fans, prior to close of tenders, and, if necessary, provide proprietary made attenuators down and/or upstream of the fans, whether shown on the drawings or not.

The sound attenuator selection procedure followed shall be similar to the method described in the "Woods Design for Sound" publication, published by Woods Fans Limited of Colchester England. The successful tenderer shall submit the design data and sound calculation sheets to the engineer for approval before ordering any fans and sound attenuators.

Others shall provide electrical isolators 1 m from the relevant fans. Tenderers shall allow for wiring the fans from these electrical isolators.

Allowance must be made for ventilation to switch off under fire conditions.

The supply, installation as per scope, testing and commissioning of the following fresh air fans;

Fan Type	Quantity	Flow (l/s)	Pressure (Pa)
Duct mounted	2	522 - 534	150
Duct mounted	1	76	150
Duct mounted	1	220 - 240	150
Wall mounted	1	36	50

The supply, installation as per scope, testing and commissioning of the following extraction air fans;

Fan Type	Quantity	Flow (l/s)	Pressure (Pa)
Duct mounted	1	3700	200
Duct mounted	1	1855	200
Wall mounted	24	220	50
Wall mounted	14	26 - 49	50

Wall mounted	3	78 - 90	50
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14. NOISE AND VIBRATION CONTROL

The Contractor shall install sufficient noise and vibration control measures on the plant/equipment, the interconnected piping, ductwork and conduit so that when the installed plant/equipment are put into operation, the resulting noise and vibration levels at locations within the building and at adjacent or nearby buildings shall not exceed the acceptable limits.

The total noise level in occupied areas within the building, whether it be airborne or structure-borne, shall not exceed the following limits when all the plant/equipment installed by the Contractor are put into operation.

Noise Control Criteria:

Broadcasting and recording studios	NC 25
Concert and opera halls	NC 25
Theatres, assembly halls and churches	NC 30
Homes, bedrooms	NC 35
Private offices, libraries, courtrooms and schoolrooms	NC 35
General offices	NC 40
Mechanised offices	NC 45
Restaurants, bars, cafeterias and canteens	NC 45
Department stores and shops	NC 45
Kitchens	NC 50

The specified noise criteria shall apply to all areas as measured at a level of 1.5 m above the floor, and the measuring points shall be 1.5 m away from the walls or doors of the rooms.

The Corrected Noise Level at potential Noise Sensitive Receiver in the adjacent or nearby building, if so identified in the Contract Documents, shall not exceed the Acceptable Noise Level stipulated in the SANS and CIBSE Standards.

Vibration transmitted from any item of equipment or material to the building structure shall be a maximum of 5%.

15. SECOND FIX (AIR FITTINGS)

All second fix positions must be confirmed on site with the Architect. Allowance must be made for the second fix to be epoxy powder coated to the approved Architects colour detail.

The flexible duct to the diffusers shall be insulated.

The grille sizes shown on the drawings relate to the neck sizes and not over flange sizes.

There shall also be balancing dampers to the above described 2nd fix equipment. This shall be commissioned before the ceiling installation is finalised.

15.1. Conditioned Supply Air Diffusers

Constant volume diffusers, shall be provided where shown on the drawings. The grilles shall be of an all-aluminium construction.

15.2. Fresh Air Supply Grilles

Supply air grilles shall be of the double deflection type. The grilles shall be of an all-aluminium construction.

15.3. Return Air Grilles

Return air grilles shall be of the fixed bladed type. The return air grilles to be hinged installed with filters and connected to the AC units with flexible ducts. The grilles shall be of an all-aluminium construction. The return air grilles sizes shall be as shown on the drawings.

15.4. Air Transfer Grilles/Door Grilles

Air transfer grilles shall be of an aluminium construction.

15.5. Extract Air-Valves

Metal type extract air-valves shall be provided where shown on the drawings. The air-valves shall be selected to have a terminal pressure loss of not greater than 30 Pa at the specified air flow rate.

15.6. Louvres

Louvres shall be of an aluminium construction. The sizes indicated on the drawings are the internal openings of louvers. An additional 50mm must be allowed for the builder's work penetration. The flange of the louver must overlap the wall.

16. COLD ROOM AND FREEZER ROOMS

16.1. General

Each room shall be of a well-known manufacturer and spares are to be freely available in South Africa. In selecting the units tenderers are to ensure that their selections fit and can be maintained in the areas allocated.

The condensing units shall be suitable for outdoor installation, completely exposed to the elements. Each condensing unit shall be housed in an epoxy powder coated enclosure, which shall make adequate provision for access and ventilation.

Allowance must be made for suitable frame/mounting brackets for the condensing units to the satisfaction of the builder and engineer. The installation shall be suitable to allow for easy access to the unit for maintenance purposes (all as per the manufacturers recommendations).

The contractor must allow for suitable support of the evaporator units. The contractor must submit installation details prior to installation for approval by the engineer making sure that access requirements for maintenance purposes are catered for in all respects.

Provision must be made for adequate refrigeration piping and drain piping, and the sizing of the piping must be done thoroughly and to the supplier's recommendations.

Refrigerant piping shall be installed on cable ladders and shall be protected against the weather and damage by galvanised sheet metal covers. Allowance must be made in the pricing for the same.

Galvanised drain piping from the indoor as well as the outdoor unit, (if required) shall be taken from the units to the nearest drain point to be identified on site. Contractors are expected to liaise with the builder in order to establish suitable drain routes for the units' drainage.

Drain pipes shall have a minimum slope of 1 in 50 with adequate support and no sagging. The Contractor shall allow for an s-bend at the drain outlet of the unit to prevent any smells from the main drainage system. (All to form part of this contract). Heater tape will be installed on drain piping in freezer rooms.

Controls and interlocking between the evaporator coil units and the condensing units form part of this contract.

The maximum noise level in all areas shall not exceed the required requirements as specified in this document and sound attenuation although not shown, shall be allowed for, if and where required.

Selections of each and every unit shall be submitted for approval before ordering of the units. All units shall be de-rated for altitude, design conditions and pipe lengths.

Fans and compressors shall be mounted on anti-vibration mountings.

Compressors shall be of the inverter controlled hermetically sealed type.

Hoisting and rigging forms part of this contract.

The size of the freezer and cold rooms and the positions of condensing units are as indicated on the drawings and in the schedule of capacities. Actual dimensions must be determined on site before manufacturing of panels. The rooms shall be complete with the following:

- Shell
- Floor (raised as indicated on drawings)
- Ramp into room
- Vapour barriers
- Door with all safety handles, heater tape where required
- Lights
- Evaporative and condensing units (air cooled)
- Refrigerant piping
- Drain piping
- Controls.
- Thermostats.
- Temperature gauges.
- Vacuum release valves.
- Meat rails where required.

Cooling capacities are specified in the schedule of capacities of this document.

Refrigerant tubing shall be in accordance with SABS 1453. Tubing shall be seamless cold drawn copper with soldered capillary fittings. The contractor shall allow for pipe supports at the following intervals:

Pipe Size	Maximum Distance Between Supports (m)
10 – 18	1,0
22	1,5
28 – 35	2,0

Flexible metal vibration absorbers shall be fitted at compressor discharge and suction connections. Absorbers shall be installed at right angles to the direction of vibration. Hangers and supports where piping penetrates through walls shall be designed to prevent transmission of vibration to the building.

A hot gas muffler shall be installed as close to the compressor as possible in positions to prevent oil trapping.

Receivers shall be provided in the liquid line between the condensing and sub cooling coils.

A quality refrigerant drier shall be provided in the liquid line on all systems. Driers shall be of the side inlet replaceable element type. Driers shall be installed with a three-valve bypass for servicing and to allow partial flow on open compressor systems in order to reduce pressure drop. All refrigerant shall flow through the drier on hermetic compressor systems. A reliable moisture indicator shall be provided for positive indication when the drier cartridge should be replaced.

A quality strainer shall be provided on all systems in the liquid line. A suction strainer shall also be provided unless the compressor is equipped with a built-in suction strainer. Combined filter-dryers are also acceptable. Strainers shall be adequately sized to ensure adequate foreign material storage capacity without causing excessive pressure drop.

A refrigerant charging connection shall be provided between the receiver or shell and tube condenser and the refrigerant drier, in the liquid line. Before charging the system with refrigerant the circuit shall be tested as specified.

Refrigerant suction lines shall be insulated by means of an cross-linked polyethylene foam tube insulation, neoprene rubber foam with quick zip fastener or equal. The insulation material shall meet the following minimum requirements:

- Temperature range : -80°C to + 120°C
- Thermal conductivity : 0,038 W/m°K at 0°C
- Thickness : 10 mm
- Density : 35 kg/m³

- Odour properties : Neutral
- Cellular structure : Totally closed
- Fire properties : Self-extinguishing to SABS

The insulation shall be applied to form a continuous and homogeneous vapour barrier over bends, supports, etc.

When completed the installation shall ensure a complete vapour barrier and any signs of sweating or dripping shall cause the installation to be rejected. Suction and delivering lines may not be insulated grouped together as for a single line.

The evaporation units shall be suitable for the room temperature specified and shall be complete with fan/s, cooling coil, drip tray, thermostatic expansion valve, heat exchangers, etc. as a matched unit with the condensing unit.

Cooling coils shall be suitable for direct expansion air to refrigerant heat transfer at the specified temperature and temperature difference. Coils shall be of extended surface type constructed of seamless copper tube with mechanically bonded aluminium or copper fins.

For low temperature applications (freezer room) fin spacing shall be adjusted to suit.

Fan motors shall be fitted with overload protection. Motor and impeller protection screens shall be fitted as applicable.

Drain pans shall be fitted to all blower coil units to collect water condensing on the coil and defrost water. The pan shall be constructed from stainless steel, at least 1,6 mm thick. The pan bottom shall slope from all sides towards the drain point. The drain point shall be taken from the bottom of the pan and shall be fitted with a screwed, 25 mm diameter or larger outlet, depending on coil size and application. The drain from the drip-pan shall be piped to the nearest building or plant room drain with 25 mm or larger galvanised pipe.

Automatic defrost control shall be fitted to all freezer rooms. Defrost shall be by means of hot gas by-pass control or electric heater elements. Where electric heater elements are to be used, these shall be three phase type balanced across the phases. Drain pans shall be fitted with electric heater elements for defrosting and drain piping shall be fitted with heater tape to prevent freezing up.

Systems shall be fitted with thermostatic, solenoid and pressure stat control.

Blower coil casings shall be all aluminium construction, preferably embossed.

All freezer and cold rooms shall be fitted with a 100 mm diameter dial type thermometer above the door. The capillary tube for the thermometer shall be taken through the wall in a 20 mm

diameter sleeve pipe sealed with silicone sealant on both sides. The bulb shall be installed 25 mm off the wall in a top corner of the room as high as possible but not directly in the air stream of the blower coil unit. Thermometer range shall match the application.

16.2. Walls and Roofs

Factory fabricated modular panels securely fastened together shall be used in the construction of free standing freezer and cold rooms and also where required for internal lining of rooms of conventional construction.

Panels shall form a continuous vapour barrier on both the inner and outer skins of the total cold/freezer room envelope, including floor insulation where specified.

Panels for walls and ceilings shall be composite panels composed of insulation material (polyphen) clad on two sides with sheet metal to form a stressed metal skin securely bonded to the insulation. The insulation shall be suitable for the applicable temperature range.

Insulation material shall be fire retardant with minimum thickness and density as set out hereunder:

Cold rooms (0°C and higher)

Material	Minimum Thickness (mm)	Density (kg/m3)
Polyphen	100	24
Polyurethane	70	40

Freezer rooms (below 0°C)

Material	Minimum Thickness (mm)	Density (kg/m3)
Polyphen	150	24
Polyurethane	100	40

Panel skins shall be of galvanised sheet steel at least 0,6 mm thick, surfaces prepared to match the finishing materials to be applied.

The skin side to be bonded to the insulation shall be prepared and coated with epoxy or vinyl primer compatible with the adhesive and insulation to be used.

The visible side of the metal skin shall be coated with baked silicone polyester or vinyl in an off-white colour.

External visible side of each wall is to be covered with 1250 mm high anodised aluminium chequer plate.

Panels shall be protected with removable protective plastic coating during transport and construction and shall only be stripped at the appropriate time.

The doors shall be of the hinged type. Door insulation, cladding etc shall be as for the wall panels. Provision shall be made for external padlocks. It shall however be possible to open the door from inside under all circumstances even when locked.

The doors shall be provided with cam type (hinged) and drop in, drop down hinges to seal properly on the floor. Hinges shall be robust and heavy duty units.

The external face of each door is to be covered with 1250 mm high anodised aluminium chequer plate.

It shall be possible to replace door gaskets.

The freezer and cold room's floors shall be applied as follows:

- The concrete base shall be thoroughly cleaned and free of loose materials etc.
- Where necessary it shall be brought to a fair finish with a cement and sand plaster.
- An under floor vapour barrier of 0,25 mm thick polyethylene membrane to SABS 952, type C, forming a continuous envelope with the wall structure shall be provided on the prepared concrete base.
- The vapour barrier shall be totally pin hole free and shall have lapped joints at least 150 mm wide, sealed with a minimum of two runs of non-hardening butyl rubber sealant.
- Insulation shall be laid on the vapour barrier in a single layer with tightly butted joints.
- Floor insulation shall be covered with a 60 mm lightly reinforced layer of concrete. Concrete strength must be 25 MPa/19 mm with mesh, reference No.195.
- The floor is to be finished with heavy duty, chemical resistant, antimicrobial polyurethane resin floor screed providing a durable textured coloured floor finish. The floor finish shall be a light blue matt finish. The polyurethane resin floor shall meet the following minimum requirements:

Fire Resistance BS476-7:	Surface spread of flame Class 2 (Indicative)
Slip Resistance	TRRL Pendulum Slip Test - Dry >80 ,Wet >35

Impact Resistance	BS8204 Part1 Cat: A (<0.5mm) ISO62721kg weight>1.8m2kg weight >1.5m
Temperature Resistance	From -25°C to 100°C (at 6mm) From -45°C to 120°C (at 9mm)
Coefficient of Thermal Expansion	ASTM C531: 3.74 x 10 ⁻⁵ oC ⁻¹
Water Permeability	Nil – Karsten test (impermeable)
Vapour Permeability	ASTM E96:90, 3g/m ² /24hrs (at 9mm thick) Abrasion Resistance Taber Abrader: 0.12g loss per 1000 cycles (1 kg load using CS17 wheels)
Compressive Strength	>60 N/mm ² (BS6319)
Flexural Strength	>20 N/mm ² (BS6319)
Tensile Strength	>10 N/mm ² (BS6319)
Bond Strength	Greater than cohesive strength Of 25 N/mm ² concrete. >1.5 MPa.
Anti-Microbial	Japanese Industrial JIS Z 280: 2000 Standard

- Floors shall be capable of withstanding distributed loads of not less than 10 kPa and concentrated loads such as at rack feet of 10 MPa.
- Each room shall be fitted with one/two lights suitable for the specified room temperature.
- Lights shall be wired from the refrigeration control panel with a separate circuit breaker.
- A combined light with indicator pilot light for control of the lights shall be next to the door for each room.
- The light switch shall be finished in neat baked enamel to blend in with the panel finish and shall be to the manufacturer's standard.
- Lights must be symmetrically spaced with regards to the shelves and rails to ensure maximum light in passages and all parts of the rooms.

- The lights and fittings complete with wiring must be entirely moisture proof and suitable for cold/freezer/hot room applications.
- The temperature in each room shall be controlled by an electronic thermostat which controls a solenoid valve in the liquid line. The compressors shall be controlled by a low pressure switch.
- Thermostats shall be of the electronic remote sensor type having a differential of not more than 2°C ($\pm 1^\circ\text{C}$). The sensor of the thermostat shall be located inside the room behind the air cooling unit in the return air stream. The sensor shall be protected by means of a perforated metal or wire screen cover.
- Defrosting of the evaporative units in the freezer rooms shall be controlled by an electronic time switch. The time switch shall switch the unit into the hot gas bypass mode or electric element defrost mode.
- The isolators complete with all necessary control equipment, for the condensing units, as shown on the drawings, forms part of this contract.
- An alarm, visible and audible, shall be sounded if any of the room temperatures exceeds the set point.

The table below summarises the equipment used in the cold room.

Equipment	Cooling Capacity(kW)	Flow Rate (l/s)	Operating Temperature (°C)
Condenser	3.2	-	2
Blower	3.0	834	2

The table below summarises the equipment used in the freezer room.

Equipment	Cooling Capacity(kW)	Flow Rate (l/s)	Operating Temperature (°C)
Condenser	3.7	-	- 20
Blower	4.0	1668	- 20

17. HUMIDIFICATION

The firearm safes are to provided with a dehumidifier to reduce the humidity in the safe room.

The humidifiers are to be 230V/50Hz allowing the dehumidifier to operate continuously. The dehumidifier is to be provided with an automatic drainage outlet and a water storage tank. The

refrigerant gas for the dehumidifier shall be R290. The humidifier shall contain an electronic controller and variable humidistat which enables the user to control the dehumidification rate, percentage of humidity and operation times.

The table below indicated the areas with dehumidifiers and their respective size;

Location	Area (m ²)	Dehumidifier Rate (l/24hr)	Air flow (m ³ /h)
External strong room in parking 1	-	25	145
External strong room in parking 2	-	25	145

18. CONDENSATE DRAINS

The subcontractor shall supply and install all condensate drain piping required for the works (indoor and outdoor units), whether shown on the drawings or not.

Others shall only provide a trapped connection point in the relevant ceilings directly above the connection to the buildings waste drainage system, unless otherwise indicated on the drawings. The internal condensate lines shall have a minimum fall of 1:100.

The drain lines from individual air-conditioning units shall have a minimum internal diameter of 20 mm.

Condensate pumps shall only be provided where it is specifically shown on the drawings, or where it is factory installed as an integral component of the air-conditioner. The condensate pumps shall be insulated as per the refrigerant lines.

External condensate drain lines shall be in Class 0 or better copper piping. Elbows and fittings shall be of the compression or capillary type. Bending of Class 0 copper piping will not be allowed. Internal condensate drain lines shall be in u-PVC.

19. FIXING OF EQUIPMENT

The Subcontractor shall identify the location of hangers and/or other support points of all equipment with a mass in excess of 25 kg to the Structural Engineer. Approval of the proposed hanging and fixing shall be obtained from the Structural Engineer, prior to carrying out the work.

All lightweight fixing to brick or concrete shall be made with steel screws and other approved plugs. Holes of the required size for the plugs, which shall suit the screws used, are to be neatly drilled in the concrete or brickwork (not in the joints between bricks) to a depth excluding plaster or soft wall finish equal to at least the length of the plugs. The plug lengths shall be such that all the threaded length of the screws are in the plugs.

Fixings to timber shall be made with greased brass wooden screws. For fixing to hollow tiles, etc., screw anchor type fixings shall be used, fitted as above as far as possible. Fixing to soft or hard fibre boards, etc., which are inaccessible to the back, shall be made with sherardized self-tapping screws of appropriate sizes.

All heavy weight fixings to brick or concrete shall be by means of appropriately sized grouted galvanised bolts or by one of the various types of suitable expanding bolt fixings. After erection of equipment all exposed metalwork of fixings shall be treated with two coats of paint to match the finish of the equipment. Bolts shall in all instances be secured by means of a washer on the bolt head side and a lock washer on the nut side of the items being bolted.

Where the Subcontractor is in any way uncertain of the method of fixing of any plant or material, the proposed fixing and loading involved shall be cleared with the Engineer prior to carrying out the work on site.

20.COMMISSIONING REQUIREMENTS

Commissioning of the various systems should be as follows:

- AC units must be cleaned of dust and residue.
- AC supplier must come through and test unit in terms of their checks to maintain guarantee.
- AC piping must be pressure tested. Said pressure tests must be witnessed by engineer or representative. The pressure test should be hydrostatic and should be tested to 1.5 times working pressure for 1 hour.
- All works in the ceiling void must be inspected for quality of installation before the ceiling is closed up.
- Air flow by fans must be checked to ensure the corrected quantities are being drawn or supplied by 2nd fix fixtures.
- Sound rating must be checked on working level to ensure there is compliance with the specified NC rating.
- Ducting must be “cleaned “on the inside to prevent dust being distributed throughout the facility.

21. ASSOCIATED ELECTRICAL WORK

All electrical switchgear and wiring required for the proper operation of the works shall be provided by the Subcontractor.

Others will, however, provide waterproof maintenance isolators adjacent to the outdoor sections of the split units. The air-conditioning contractor will allow for the necessary wiring between the isolators and the individual units.

Isolators shall furthermore be provided by others within 1 m of all ventilation fans. The air-conditioning contractor is to allow for the connection between these isolators and his equipment.

Others will furthermore provide the following conduits and draw boxes:

- Ø20 mm Conduits with draw wires between the indoor unit and remote control station of each air-conditioner.

The conduits shall terminate in 100x50 mm recessed draw boxes at the remote control sensor positions, at the height as light switch at 1 200 mm above finished floor level.

Tenderers shall indicate whether the above power supplies are sufficient or not and whether additional plug points, conduits and draw boxes are required. All costs arising from the failure to comply with this instruction will be for the Subcontractors account.

The HVAC contractor shall liaise with the Principal Contractor and Electrical Subcontractor and provide all necessary assistance, information (such circuit breaker type and overload protection required), etc., to ensure that the correct power supplies are provided to the HVAC equipment. The HVAC contractor shall ensure that the power supply to the equipment is installed correctly and that, once switched on, it will not damage the equipment.

All costs arising from the failure to comply with the above instructions will be for the Subcontractors account.

22. MAINTENANCE AND SERVICING

The Contractor shall be responsible for all maintenance for the full 12 month contract period. During this period, the Contractor shall make good any defect due to inferior materials or workman ship and maintain all plant and equipment in perfect operating condition.

The Contractor shall be entirely responsible for carrying out regular monthly inspections and for full servicing of all components of the installation in accordance with the manufacturer's instructions at intervals not greater than 3 months.

The Contractor shall prepare a detailed inspection and service report in the form of a check list and log sheet showing all functions to be carried out at each inspection and service. Copies of these service reports shall be regularly submitted to the Department after each service.

The Contractor shall also maintain a plant logbook on site in which he shall record, sign and date all work carried out at each inspection.

The Contractor shall allow for all expendable materials necessary for servicing such as lubricating oils, grease, and cleaning materials. The Contractor shall also allow for cost of labour, travelling, etc.

23. SCHEDULES OF PARTICULARS

All schedules which accompany this tender notice, form an integral part of it and shall be duly completed in every detail: FAILING which, the tender in question may be rendered ineligible for consideration. Under no circumstances will the following statements be acceptable:

- See attached pamphlets
- Refer to catalogue
- Data to follow
- As given by the supplier

Equipment offered and listed on the schedule shall be capable of performing the specified duties and complying with the Specification requirements in all respects: Should it transpire that such equipment, even when offered by make, model and/or type, is unsuitable or incapable of meeting, or performing in accordance with, the Sub-contractor shall nevertheless be responsible for any additional costs incurred in providing the required or suitable equipment.

Whenever a specific make, model or type of equipment has been prescribed in the specification and the tender offers alternative, or equal make or type of equipment in the tender, the Department will in acceptance of such a tender inform the prospective contractor in writing as to the make, and/or type of equipment accepted. However, it should be noted that the use of words "OR EQUAL" by the tender is to be discouraged and could lead to the disqualification of the tender.

24. DRAWINGS

The following drawings form part of this document:

No.	Drawing Title	Service	Drawing Number
1	Block A and B - Ground and First Floor HVAC Layout	HVAC	2021-19-TTA-HVAC-AB-DR-01
2	Block C and D - Ground and First Floor HVAC Layout	HVAC	2021-19-TTA-HVAC-CD-DR-02
3	Block E and F - Ground and First Floor HVAC Layout	HVAC	2021-19-TTA-HVAC-EF-DR-03
4	Kitchen - Ground Floor HVAC Layout	HVAC	2021-19-TTA-HVAC-K-DR-04



NATIONAL DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE

TECHNICAL SPECIFICATIONS LIQUEFIED PETROLEUM GAS (LPG) SERVICES

THABONG SAPS – TRAINING ACADEMY

TABLE OF CONTENTS

A. GENERAL	12
1. INTRODUCTION.....	12
2. SPECIFICATION AND STANDARDS.....	12
3. MATERIAL AND WORKMANSHIP	12
4. DRAWINGS.....	13
5. COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS.....	13
6. MANUFACTURER'S RATINGS.....	13
7. SHOP DRAWINGS.....	13
8. AS-BUILT DRAWINGS.....	14
9. BUILDING WORK	14
10. SITE INSPECTION	14
11. DETAILS OF MAINTENANCE WORK	14
12. GUARANTEE.....	15
13. SANS SPECIFICATION.....	15
14. INSTRUCTIONS MANUALS SIMILAR OR EQUAL.....	15
15. SIMILAR OR EQUAL	15
16. SPARE PARTS.....	15
17. DAMAGE	15
B. PARTICULAR TECHNICAL SPECIFICATIONS FOR THE SUPPLY, DELIVERY, AND INSTALLATION OF LPG EQUIPMENT	17
1. SCOPE OF WORKS	17
1.1. Work, Plant, Equipment and Services etc. excluded	17

1.2.	Work, Plant, Equipment and Services etc. included	17
1.3.	General Description: LPG Gas Installation	18
2.	GENERAL	18
2.1.	Commissioning Requirements	19
2.2.	Battery Limits	19
2.3.	Site Information.....	19
3.	DRAWINGS.....	19

A. GENERAL

1. INTRODUCTION

The purpose of this document is to describe the scope of works required for the LPG gas installation at the Thabong SAPS Training Academy.

This document must be read in conjunction with the reference drawings and bill of quantities.

The successful LPG gas contractor will be the sub-contractor to the main building contractor on site. The successful LPG gas contractor must ensure that they are able to meet the program dates of the main contractor including commissioning and hand-over.

2. SPECIFICATION AND STANDARDS

This supplementary specification is to be read as forming part of one or more Department of Public Works and Infrastructure Standard Specifications. The Department Standard Specifications for the Electrical Installations and Electrical Equipment pertaining to Mechanical Services shall also apply.

All equipment and installations shall comply with the requirements of the Occupational Health and Safety Act.

Where conditions are at variance this supplementary specification shall have preference over both the standards specifications and the drawings.

The installation shall be erected in compliance to the following standards and regulations:

- SANS 10087-1:2008: The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial, and industrial installations
- The Occupational Health and Safety Act 85 of 1993
- PW325 – Manual for Electrical and Mechanical Consulting Engineers

3. MATERIAL AND WORKMANSHIP

All material and equipment shall be new, free from rust, defects, undamaged and suitable for the purpose for which it will be used. Material shall comply with the latest issue of the relevant SANS specifications where applicable.

If any material or workmanship is not to the satisfaction of the Department, it shall be rectified and /or replaced at the contractor's cost and all rejected material shall immediately be removed from the site. The contractor is responsible for the correct and complete erection of the installation and inspections executed by the Department do not exempt the contractor of this obligation.

4. DRAWINGS

Any drawing which accompanies this specifications illustrates schematics and do not show exact dimensions or positions of equipment. Tenders must satisfy themselves that the equipment offered by them shall fit in the available space and can be positioned so that access for maintenance, repair or removal is not encumbered.

Note: Final dimensions must be taken on site before any equipment or material is either purchased or manufactured.

5. COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS

Only specialists sub-contractors who have previously successfully completed mechanical installations of the extent and type specified in this document shall be considered.

Note: No change in make, type, or capacity of equipment specified in the schedule of particulars shall be allowed after acceptance of the tender without the written approval of the Department.

6. MANUFACTURER'S RATINGS

All equipment shall be able to work within the rated capacity, as determined by the manufacturer. Any equipment offered for the use out of these limits shall not be considered. Contractors shall hand in the rated capacities of all equipment as well as descriptive literature with the tender documents.

7. SHOP DRAWINGS

Within 14 days of being awarded the contract the contractor will produce a complete layout in the form of a shop drawings with all the required service connections detailed and

dimensioned. Any other shop drawings required to effect the installation shall be produced as required. At the end of the contract, three full sets of "as built" drawings and manuals shall be provided for this contract.

The successful tenderer shall before commencing manufacture of any of the equipment provide a dimensioned shop drawing for approval.

Approval of the contractor's drawings in no way indemnifies him from being responsible for the correctness of the drawings and satisfactory operation of the installations and for equipment.

8. As-Built Drawings

As-built drawings shall be prepared by the Subcontractor. These drawings shall be submitted to the Engineer for approval 1 week prior to the programmed date for the practical completion inspection of the last section of the works.

9. BUILDING WORK

All building work to be done by the building contractor as shown on the mechanical shop drawings. All other small building work such as cutting and drilling of holes forms part of this contract.

10. SITE INSPECTION

Tenderers are advised to visit the site to acquaint themselves with the local conditions, accessibility, etc. No claims for compensations due to lack of knowledge of conditions will be accepted.

11. DETAILS OF MAINTENANCE WORK

The contractor shall be responsible for the complete maintenance of all the equipment, components, installations and systems forming part of this installation for 12 months.

12. GUARANTEE

The tenderer shall guarantee equipment for a period of twelve months from the date on which the installation /fixing of all the units is satisfactorily completed.

The contractor shall repair, at his own cost, defects that may become defective during the guarantee period due to the inferior materials or workmanship (fair wear and tear excluded). Any part so replaced, shall be guaranteed for a further year from the date of replacement.

13. SANS SPECIFICATION

All references to the South African National Standards and Codes of Practice shall be deemed to be references to the latest issues of such specifications and codes.

14. INSTRUCTIONS MANUALS SIMILAR OR EQUAL

A maintenance and operation instruction manual, including spare parts list shall be provided with each mechanical and electrical unit.

15. SIMILAR OR EQUAL

Any trade name mentioned merely serves as a guideline and does not indicate preference for that specific make. Tenderers are at liberty to offer any other equipment and /or material, which comply with the specification requirements.

16. SPARE PARTS

Spare parts for each mechanical and electrical appliance shall be readily available in the Republic of South Africa, for a minimum period of 10 years.

17. DAMAGE

The tenderer will be held entirely responsible for any damage which may occur to equipment during the transportation, setting into position and fixing and must make good any such damage at his/her own risk.

No patching or repairing of damaged units will be allowed unless such damage can be completely effectively repaired and to the entire satisfactions of the Representative/Agent.

B. PARTICULAR TECHNICAL SPECIFICATIONS FOR THE SUPPLY, DELIVERY, AND INSTALLATION OF LPG EQUIPMENT

1. SCOPE OF WORKS

This particular Technical Specification is for the supply and installation of the LPG installation services at the Thabong SAPS Training Academy.

This section of the enquiry document covers what is required in terms of the LPG gas installation and will not include anything else than the following:

- Work and Equipment Excluded
- Work and Equipment Included
- Battery Limits
- Information and Data to be submitted
- Commissioning Requirements

1.1. Work, Plant, Equipment and Services etc. Excluded

The items of plant, equipment and work listed hereunder are specifically excluded from the scope of the contractor's obligations.

The tenderer will however furnish full details in the tender data sheets of any further items of equipment, material and work not provided for in its tender

List of exclusions

- Storage of Equipment

All items of plant, equipment and work not listed above and in the tender data sheets as being excluded, will be deemed to be included in the tender and / or contract prices.

1.2. Work, Plant, Equipment and Services etc. Included

This Specification provides and includes for;

- The design, manufacture, inspection, testing, supply, packing, forwarding and delivery of plant, equipment and materials to the site, including the payment of all freight, insurance, import, customs, excise and other duties, levies, forwarding, railage and all other transportation and delivery charges

- The furnishing of "know-how", for the successful operation/functioning of the plant/equipment/process
- Management of manufacturing and delivery of LPG gas components
- Interface with main contractor during commissioning
- The supply and delivery of commissioning spares
- The supervision of and responsibility for the commissioning including preliminary trials, final testing, starting, setting to work, proving and handing over to Client of all plant, equipment and materials in full working order under the stated operating conditions and complying with the performance and other guarantees specified
- The supply of all specified operating, training and maintenance information including complete parts data, parts manuals (if applicable) and drawings as specified
- The remedy of the plant and equipment during the "Defects Liability Period"
- The supply of all services, information and data
- Any other items not covered by the foregoing, but forming part of the contractor's obligations and responsibilities

1.3. General Description: LPG Gas Installation

The General Description must be read in conjunction with the bill of quantity and drawings.

The LPG installation will be constructed and will include but not be limited to:

- The installation in kitchen will include the supply of 4 off 48 kg gas bottles, 4 off connected per supply, with change over valve and high pressure regulator.
- Facilitate and generate contract for the facility for a service level agreement for gas cylinders.
- Contractor must allow for supply, installation and pressure testing as per SANS 10087.
- The installer must be registered with the Liquid Petroleum Gas Association of South Africa. The minimum grade of registration must be Commercial Installer (up to and including 4 x 48kg LPG cylinders installation).
- Piping is to be surface mounted.
- Supply and install of all relevant signage onto gas storage.

2. GENERAL

The contractor shall as part of the contract also allow for:

All the foregoing will be carried out by the Contractor in accordance with the Specification and the other contractual documentation to complete the Contract Works within the Contract Program and at the Contract Price stated in the Contract.

The whole of the Contract Works will be complete in every respect, ready for operation and continuous production at full load. Should any part or parts of the plant/ work/ services/ information which may be necessary for the satisfactory operation and maintenance of the plant/ equipment be omitted by the Contractor, such items will be provided expeditiously by the sub-contractor free of all extra cost to the Client.

2.1. Commissioning Requirements

The LPG gas system is to be pressure tested as per SANS 10087 for at least 40 minutes, and must be witnessed by the engineer or representative.

Once the installation and commissioning is completed a Certificate of Compliance must be provided by the installer.

2.2. Battery Limits

- Cylinders will be placed on an already pre-constructed area

2.3. Site Information

The Thabong SAPS Training Academy is located on 8004/1 Modikeng Road, Thabong, Welkom, Free State.

3. DRAWINGS

The following drawings form part of this document:

No.	Drawing Title	Service	Drawing Number
1	Liquefied Petroleum Gas (LPG) Layout Kitchen	LPG	2021-19-TTA-LPG-DR-01
2	Kitchen Equipment Layout	Kitchen Equipment	2021-19-TTA-KE-DR-01

NATIONAL DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE

TECHNICAL SPECIFICATIONS WET SERVICES

THABONG SAPS TRAINING ACADEMY– REPAIR AND RENOVATION

TABLE OF CONTENTS

1. INTRODUCTION	10
2. SCOPE OF WORK	10
3. HOT WATER SYSTEM	10
3.1. Geysers	10
3.2. Heat Pumps	10
4. PIPING	11
5. VALVES	11
6. DRAINAGE INSTALLATION	11
7. APPROVALS	12
8. BATTERY LIMITS	12
8.1. Electrical	12
8.2. Civil	12
9. ALLOCATED SPACE	12
10. COORDINATION WITH OTHER TRADES	12
11. BUILDER'S WORK	13
12. DRAWINGS	13
13. SHOP DRAWINGS	13
14. WATERPROOFING	14

15.	ALTERNATIVE MANUFACTURE AND PRICES.....	14
16.	MATERIALS, WORKMANSHIP AND EQUIPMENT OFFERED	14
17.	STATUTORY AND REGULATORY REQUIREMENTS, DOCUMENTATION AND DRAWINGS.....	15
18.	SANS SPECIFICATION.....	16
19.	GUARANTEE AND MAINTENANCE	16
20.	SUBMISSION BY CONTRACTOR.....	16
21.	COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS.....	17
22.	SUPPORTS	17
23.	PERFORMANCE OF SYSTEMS AND EQUIPMENT	17
24.	PAINTING.....	18
25.	CORROSION PRECAUTIONS AND FINISHES.....	18
26.	DAMAGE	19
27.	TUITION	19
28.	TENDER SUBMISSIONS.....	20
29.	COMMISSIONING	20
30.	OPERATING AND MAINTENANCE MANUALS.....	21
31.	DRAWINGS.....	22

1. INTRODUCTION

The purpose of this document is to outline the scope of work and specification for the wet Services installation at the Thabong SAPS Training Academy, located at 8004/1 Modikeng Road, Welkom, Free State.

The wet services contractor is expected to communicate with main contractor on program and site co-ordination issues that could arise on this site. The wet services contractor must also be aware of sanitary fittings which is considered an architectural component and must be allowed for in the installation. As far as possible equipment should be sourced from South Africa to remove issues that shall arise related to exchange rate and transport.

2. SCOPE OF WORK

The scope of work is the installation of cold water reticulation and hot water reticulation within the building. The installation shall be from the new incoming line of the civil connection.

3. HOT WATER SYSTEM

Hot water supply is provided by a heat pump connected to a hot water cylinder with a backup heating element for the ablutions and kitchen and by a point of use heaters systems in the bedrooms. The position of the equipment and electrical requirements are indicated on the drawings, however the wets sub-contractor is required to coordinate with the electrical sub-contractor on site.

3.1. Geysers

The geysers shall be a mounted type with insulation and suitable safety valves. Each geyser shall come with the corresponding heating element, openings for safety valve, cold water inlet and hot water outlet. The geyser shall contain all necessary statutory requirements of a pressure vessel including safety valve and pressure gauge. They should be rated to handle a pressure of 600 kPa.

3.2. Heat Pumps

The heat pump is the primary heating operation for the geyser. A circulating pump may be required for the operation of the suitable heat pump, this depends of the on commercial brand of heat pump.

The heat pump is sized for a 3 hour recovery time.

The electrical reticulation from the isolator is in the scope of the wet services contractor, to ensure correct functioning of the system.

The heat pumps shall be mounted on the outside of the building like an HVAC condenser.

The heat pumps shall contain inverter type technology. The heat pumps shall be equipped with rotary compressor and a shell and tube heat exchanger and shall use R417a refrigerant gas. The heat pump shall be able to supply hot water up to 60°C maximum and be able to operate at 5°C ambient temperature.

4. PIPING

The pipe size indicated on the drawing are sized to SANS 460 class 2 copper piping. The piping shall be mounted on purpose made supports not exceeding those indicated on the SANS specification.

The proposed support detail must be sent to the wets engineer for approval before manufacture.

5. VALVES

Shut-off Valves – These can either be ball or gate valves with rubber seat and suitable for water and temperature up to 60 deg C.

Non-Return Valves – These can be swing type check valves and suitable for the process conditions defined.

Strainer valves – Y type strainer valves are specified for this project and process requirements.

All suggested valves must be sent to engineer for approval before procurement.

6. DRAINAGE INSTALLATION

The drainage installation will include a uPVC pipe network complete with bends, joints, Y & T-piece fittings, junctions, coupling and connection to sanitary and brassware fittings. The installation will connect to the civil battery limit.

At points indicated on drawing where the drainage stack goes through the roof, flashing will be applied at that point and treated to manufacturer specification to make area waterproof.

Drainage to be provided to HVAC units. HVAC drainage is to tap into the closest wet drainage point.

7. APPROVALS

All equipment or material offered shall be from the same manufacturer.

Approval by other organisations shall if it is deemed satisfactory, be granted by the Engineer, on application.

8. BATTERY LIMITS

8.1. Electrical

- Isolator at hot water cylinder, heat pump, point of use heater and hydro-boil.

8.2. Civil

- Water supply points at the building boundary
- Drainage connection points at the building boundary

9. ALLOCATED SPACE

The physical sizes of the equipment offered shall be suitable for the locations shown on the drawings and shall be positioned in such a manner to ensure reasonable access all around the equipment for maintenance purposes, as recommended by the suppliers of the equipment, or as per any relevant statutory requirements.

Tenderers are to advise the Engineer at close of tender, in the form of a letter enclosed with the tender documents, should any of the plant areas not be adequate to accommodate their equipment. No claim of whatever nature, arising out of the Tenderer's failure to do so, will be entertained.

10. COORDINATION WITH OTHER TRADES

The contractor shall plan his work in advance and shall coordinate all space requirements in conjunction with the Principal Contractor and electrical contractor, especially where other

trades share the same space. Where conflicts occur, the contractor shall request clarification from the Architect and/or Engineer.

11. BUILDER'S WORK

The successful tenderer shall, within 14 days of acceptance of this tender, provide the Engineer via the Principal Contractor with all Builder-provided work such as holes, machine bases, chases, recesses, service ducts, wooden sleeves and frames, etc., as herein identified being provided by others and which will be required to accommodate his services.

No structural element shall be erected and no holes shall be cut or made through the structure and no items of equipment shall be supported from the structure without the prior approval of the Structural Engineer or at least the Principal Contractor. Where foundations, machine bases, drained ducts, floor channels, cable sleeves, etc., have been identified herein to be provided by others, the contractor shall liaise and assist the Principal Contractor or others in setting out, locating, etc., of these items.

The contractor shall be responsible for the cost of all cutting, patching, making good, etc., as may be required to accommodate his work, due to late or wrong information been given by the contractor.

12. DRAWINGS

Any drawing which accompanies ~~this~~these specifications illustrates schematics and do not show exact dimensions or positions of equipment. Tenders must satisfy themselves that the equipment offered by them shall fit in the available space and can be positioned so that access for maintenance, repair or removal is not encumbered.

Note: Final dimensions must be taken on site before any equipment or material is either purchased or manufactured.

13. SHOP DRAWINGS

Within 14 days of being awarded the contract the contractor will produce a complete layout in the form of ~~a~~-shop drawings with all the required service connections detailed and dimensioned. Any other shop drawings required to effect the installation shall be produced as

required. At the end of the contract, three full sets of "as built" drawings and manuals shall be provided for this contract.

The successful tenderer shall before commencing manufacture of any of the equipment provide a dimensioned shop drawing for approval.

Approval of the contractor's drawings in no way indemnifies him from being responsible for the correctness of the drawings and satisfactory operation of the installations and for equipment.

14. WATERPROOFING

Where any work pierces waterproofing, including waterproof concrete and roofing, the method of installation shall be approved by the Architect and/or Engineer before the work is carried out.

All necessary sleeves, caulking, skirts, soaker sheets, flashing, etc., required to make the openings absolutely water-tight shall be provided by the contractor, or shall be handed over to others for installation.

15. ALTERNATIVE MANUFACTURE AND PRICES

The tendered Subcontract Sum shall be for work and materials as specified herein. Should the tenderer wish to offer alternative equipment, etc., the details shall be submitted in a covering letter accompanying the tender and clearly identifying the extent, quality and advantages of the alternative(s).

Acceptance of the alternative(s) shall be at the discretion of the Engineer.

Any price submitted for alternatives, variations, extras, saving, omissions, etc., whether prior to tender acceptance or during the construction stage of the works shall be taken to include the applicable Value Added Tax (VAT), unless clearly identified otherwise at the time of its submission.

16. MATERIALS, WORKMANSHIP AND EQUIPMENT OFFERED

Materials, workmanship and equipment offered shall be as specified and comply with the specification.

All material and equipment shall be new, free from rust, defects, undamaged and suitable for the purpose for which it will be used. Material shall comply with the latest issue of the relevant SANS specifications where applicable.

If any material or workmanship is not to the satisfaction of the Department, it shall be rectified and /or replaced at the contractor's cost and all rejected material shall immediately be removed from the site. The contractor is responsible for the correct and complete erection of the installation and inspections executed by the Department do not exempt the contractor of this obligation.

The term 'approved equal', as used herein, shall mean an item generally the same as the specified one, but of different manufacture. It shall meet all the specified parameters and approval for its use shall be obtained in writing from the Engineer.

17. STATUTORY AND REGULATORY REQUIREMENTS, DOCUMENTATION AND DRAWINGS

This supplementary specification is to be read as forming part of one or more Department of Public Works and Infrastructure Standard Specifications. The Department Standard Specifications for the Electrical Installations and Electrical Equipment pertaining to Mechanical Services shall also apply.

All equipment and installations shall comply with the requirements of the Occupational Health and Safety Act.

Where conditions are at variance this supplementary specification shall have preference over both the standards specifications and the drawings.

The Complete works shall comply in particular with the specifications and requirements of:

- SANS 10252-1: Water supply to buildings
- SANS 460: Plain-ended solid drawn copper tubes for potable water
- SANS 241-1: Drinking water Part 1: Microbiological, physical, aesthetic and chemical determinands
- SANS 241-2: Drinking water Part 2: Application of SANS 241-1
- SANS 10140: Identification colour marking
- SANS 15875: Plastics piping systems for hot and cold water installations
- SANS 10142: The wiring of premises
- SANS 10400-A: General principles and requirements
- The Occupational Health and Safety Act, Act 85 of 1993, as amended.

This detailed specification and the drawings form part of the tender documents.

Deviation from this specification shall immediately be reported to the Engineer.

The works shall furthermore comply with all the requirements and bylaws of the relevant local authority. Where the proposed layouts, or any of the materials specified, etc., do not comply with these regulations, the matter shall immediately be brought to the attention of the Engineer.

Certificates of approval/ inspection from the local and/or statutory authorities shall be submitted to the Engineer before the final payment certificate will be issued.

The contractor shall furthermore issue all notices and pay all fees required to be given or paid in terms of statutory and regulatory requirements and the relevant local authority's bylaws.

18. SANS SPECIFICATION

All references to the South African National Standards and Codes of Practice shall be deemed to be references to the latest issues of such specifications and codes.

19. GUARANTEE AND MAINTENANCE

The tenderer shall guarantee equipment for a period of twelve months from the date on which the installation /fixing of all the units is satisfactorily completed.

The contractor shall repair, at his own cost, defects that may become defective during the guarantee period due to the inferior materials or workmanship (fair wear and tear excluded). Any part so replaced, shall be guaranteed for a further year from the date of replacement.

The contractor shall provide free maintenance for a period of 1 (one) year following the hand over to the client. The maintenance shall include for all management, labour, lubricating materials, cleaning materials and transport

20. SUBMISSION BY CONTRACTOR

The contractor shall take note that all equipment selections approved by the Engineer shall not relieve the contractor of his obligations to comply with the specification.

The following information with regard to specified equipment shall be submitted to the Engineer:

- Manufacturer, name and model
- Motor capacity
- Power Consumption
- Diagrams, tables and graphs detailing the performance of the equipment where applicable.
- Applicable pamphlets or catalogue information
- Name and address of manufacturer and/or distributor
- Number of years that equipment has been available in RSA
- Any other relevant information required by the Engineer

The above submissions are required after the appointment of the Contractor and in accordance with the requirements of the main contract programme.

21. COMPREHENSIVE CONTRACTS AND SUB-CONTRACTORS

Only specialists sub-contractors who have previously successfully completed mechanical installations of the extent and type specified in this document shall be considered.

Note: No change in make, type, or capacity of equipment specified in the schedule of particulars shall be allowed after acceptance of the tender without the written approval of the Department.

22. SUPPORTS

No supports for the piping etc. are shown on the drawings. The Contractor shall allow for sufficient supports as specified in the Standard Specification for Plumbing & Drainage installations.

23. PERFORMANCE OF SYSTEMS AND EQUIPMENT

The systems and equipment layout designed by the Engineer shall conform to the requirements with regard to installation and system performance. This suggests that the performance of the equipment in the system supplied and installed by the contractor, shall be in accordance with the design and performance figures as published by the manufacturers and/or suppliers.

The efficiency of the design of the specified system is not the responsibility of the contractor. It is, however, the responsibility of the contractor to ensure that the quality of the workmanship and the installation of the equipment shall conform to the requirements of the Engineer and to the supplier/manufacturer.

It is furthermore accepted that the contractor has assured himself that all equipment supplied and installed under the contract shall perform within the given limits, as stated by the supplier/manufacturer, conforming to the specification.

24. PAINTING

All equipment, where required, shall be painted.

The colour of the materials and equipment shall be painted in accordance with SANS 10140: Identification colour markings Part 3: Contents of pipelines.

25. CORROSION PRECAUTIONS AND FINISHES

All materials such as brackets, hanger, etc., shall be shot-blasted, pre-painted, galvanised or treated against corrosion prior to their delivery to site. Any work that will require site cutting, etc., i.e. exposure of the bare steel to the atmosphere, shall immediately be treated by cold galvanising, painting, etc.

The method of treatment for the above shall depend on the particular environment and type of surface to be coated. The surface preparation, primer coats, finishing coats, etc. shall therefore be in accordance with those specified by reputable paint manufacturers.

All black steel piping, support brackets, hangers, etc., installed inside the building shall be treated with two coats of corrosion inhibitor paint prior to installation. The first coat shall be allowed to dry completely before the next coat is applied. A further coat of corrosion inhibitor shall be applied after installation and allowed to dry completely. Two coats of enamel paint, to the Architect or Engineer's specification, shall finally be applied. The first coat shall be allowed to dry completely before the next coat is applied.

All black steel piping, support brackets, hangers, etc., exposed to the weather shall be hot dipped galvanised.

All duct, supports, equipment and materials exposed to view (i.e. not in shafts, false ceiling, bulkheads, etc.) shall be cleaned, primed and then finished with two coats of enamel paint to

the Architect or Engineer's specification. Each application shall be allowed to dry completely before the next coat is applied. The only exception to these stipulations shall be in the case of subcontracts, where the contractor shall only apply the primer coats and the Principal Contractor the finishing coats.

Colour coding shall follow the coding currently used on site. If no colour coding is in use, or in the case of new installations, the latest SANS 10140 Standards shall be used.

Plant and equipment, pre-painted or pre-primed at the factory shall be examined to ensure that the paint finishes are in a good condition. If not satisfactory, priming paint or finishing coats shall be removed where necessary, the surface cleaned to remove rust, and all such surfaces re-primed and finished in two coats of high quality paintwork to match the original.

The contractor shall fix black on white ivory labels to all items of equipment (machinery, fans, pumps, electric heater batteries, humidifiers, air handling units, etc.), as well as to all active valves (motorised and solenoid) and major isolating valves.

The labels shall be screwed or pop-riveted to the equipment and attached to the valves with steel cables. The lettering shall not be less than 10 mm in height and the wording shall be approved by the Engineer. The wording and tag numbers shall be the same as those used in this specification and indicated on the drawings.

26. DAMAGE

The tenderer will be held entirely responsible for any damage which may occur to equipment during the transportation, setting into position and fixing and must make good any such damage at his/her own risk.

No patching or repairing of damaged units will be allowed unless such damage can be completely effectively repaired and to the entire satisfactions of the Representative/Agent.

27. TUITION

The contractor shall provide capable instructor/s to train the client's personnel. These instructor/s shall be available for a total period of 1 (one) working day (eight hours) after the system has been commissioned and handed over to the client. The Operating and Maintenance Manuals shall be in possession of the client before the training commences.

28. TENDER SUBMISSIONS

Tender submissions shall conform strictly to the specification requirement. Tenders that are not in accordance with the specification will not be considered.

29. COMMISSIONING

Commissioning of the works shall form part of the Subcontract. Commissioning shall be meticulous and all procedures as stipulated by the suppliers of the equipment shall be strictly adhered to.

The contractor shall prepare detailed commissioning schedules well in advance of the programmed practical completion inspection date.

The schedules shall make allowance for all measurements that will be required, checking of operational and safety set-points, test results, etc., and shall be submitted to the Engineer for approval prior to the start of commissioning.

The contractor shall submit the completed schedules to the Engineer for checking after commissioning has been completed, and prior to the practical completion inspection.

The contractor is forewarned that the Engineer will under absolutely no circumstances deviate from the above procedure. The Engineer furthermore reserves the right to refuse to carry out the practical completion inspection until the contractor has complied with the above stipulations. The contractor shall accept this reserved right by the act of tendering.

Each task in these schedules shall be countersigned by the contractor's Commissioning Engineer to ensure that any discrepancies between site and commissioning conditions/data can be clarified.

All piping systems to be pressure tested to 1.5 times working pressure i.e. 900 kpa. Cold commissioning must be witnessed by the engineer of the project.

Hot commissioning must be undertaken with the relevant suppliers present to ensure final checking and guarantees are in place.

The minimum commissioning requirements are:

Initial visual check

- Correct models, types, etc. provided.
- Equipment located in correct positions and parallel to building lines unless otherwise specified.

- Shipping fasteners, clamps, etc. removed or released.
- Joints tight and correctly fitted.
- All fasteners in position and tight.
- Coil piping correct configuration. (Counter flow, IN-at-the-bottom, OUT-at-the- top, etc.).
- Existence of sufficient and where applicable correctly fitted bleed-off, vent valves, drains etc., as specified. (Both at components and in pipework).
- Thermal expansion and contraction allowances.
- Access panels provided and are hinged complete with handles, patches, locks etc.
- Natural free movement of rotary/moving equipment.
- Proper isolation of rotary/moving equipment (check canvas collars anti-vibration mounts, flexible couplings/rubber mounts, etc.).
- Soundness and alignment of general supports.
- Grommets provided against chaffing at all pipe cables, etc. penetrations through housings etc.
- Installation workmanship and finish.

30. OPERATING AND MAINTENANCE MANUALS

Three sets of operating and maintenance manuals shall be prepared by the contractor. These manuals shall be submitted to the Engineer for approval 1 week prior to the programmed date for the practical completion inspection.

Tenderers are to note that the said practical completion inspection shall not be carried out prior to the approval of these operating and maintenance manuals.

The manuals shall be properly bound and titled. Each set shall consist of 4 sections. Each section shall have the following sub-sections:

Section 1 - Operation

Introduction:

Short description of the complete system to familiarise laymen with the system lay-out and operation.

Detailed description:

A detailed description of each system and its equipment, complete with schematic drawings. The purpose of this system is to explain the intended operation of each system and item of

equipment to technical personnel. Detailed descriptions of the operation, set-points, adjustments, etc., are thus to be included.

Section 2 - Commissioning data

Schedules of data:

Detailed schedules of commissioning data of all the systems shall be included in this section for future reference. These schedules shall include, amongst others, air flow rates, major equipment power draws, pressure drops, etc.

Section 3 - Maintenance

Schedules:

This section shall contain detailed maintenance and service schedules for the complete installation.

Equipment details:

This section shall contain manufacturers' brochures, spare parts lists, etc., of all the items of equipment.

List of suppliers:

The list of suppliers (complete with addresses and telephone numbers) for each item of equipment shall be included in this section.

Section 4 - Drawings

As-built drawings:

A complete set of as-built drawings shall be enclosed in this section.

31. DRAWINGS

The following drawings form part of this document:

No	Description	Drawing Number
1	Block A - Ground and first floor wets layout	2021-19-TTA-WETS-A-DR-01
2	Block A - Ground and first floor drainage layout	2021-19-TTA-WETS-A-DR-02
3	Block B - Ground and first floor wets layout	2021-19-TTA-WETS-B-DR-01

4	Block B - Ground and first floor drainage layout	2021-19-TTA-WETS-B-DR-02
5	Block C - Ground and first floor wets layout	2021-19-TTA-WETS-C-DR-01
6	Block C - Ground and first floor drainage layout	2021-19-TTA-WETS-C-DR-02
7	Block D - Ground and first floor wets layout	2021-19-TTA-WETS-D-DR-01
8	Block D - Ground and first floor drainage layout	2021-19-TTA-WETS-D-DR-02
9	Block E - Ground and first floor wets layout	2021-19-TTA-WETS-E-DR-01
10	Block E - Ground and first floor drainage layout	2021-19-TTA-WETS-E-DR-02
11	Block F - Ground and first floor wets layout	2021-19-TTA-WETS-F-DR-01
12	Block F - Ground and first floor drainage layout	2021-19-TTA-WETS-F-DR-02
13	Kitchen - Ground floor wets layout	2021-19-TTA-WETS-K-DR-01
14	Kitchen - Ground drainage layout	2021-19-TTA-WETS-K-DR-02
15	Wets process and instrumentation diagram Part 1	2021-19-TTA-WETS-PID-DR-01
16	Wets process and instrumentation diagram Part 2	2021-19-TTA-WETS-PID-DR-02
17	Wets process and instrumentation diagram Part 3	2021-19-TTA-WETS-PID-DR-03
18	Wets process and instrumentation diagram Part 4	2021-19-TTA-WETS-PID-DR-04
19	Wets process and instrumentation diagram Part 5	2021-19-TTA-WETS-PID-DR-05
20	Wets process and instrumentation diagram Part 6	2021-19-TTA-WETS-PID-DR-06
21	Wets process and instrumentation diagram Part 7	2021-19-TTA-WETS-PID-DR-07