UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

TENDER NUMBER: COM46/2023

TENDERER NAME:	

CLOSING DATE: 5 JULY 2023 AT 11h00

CSD REG NUMBER: MAAA……

EMPLOYER :	**ENGINEER :**
CITY OF MBOMBELA PO Box 45 Mbombela 1200 TEL: 013-759 2181	**TFC ENGINEERS (Pty) Ltd** PostNet Suite #370 Private Bag X11326 Mbombela 1200 Tel : 013-752 7475 E-mail : info@tfce.co.za

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

SUMMARY FOR TENDER OPENING PURPOSES

NAME OF TENDERER : _____

ADDRESS : _____

_____

_____

_____

TELEPHONE NUMBER : _____

FAX NUMBER : _____

E-MAIL ADDRESS : _____

CLOSING DATE : _____

Signed by authorised representative of the TENDERER: _____

DATE: _____

* Should any discrepancy occur between this figure and that stated in the Form of Offer and Acceptance, the latter shall take precedence and shall apply.

IMPORTANT INFORMATION

1. PLEASE READ CAREFULLY BEFORE COMPLETING DOCUMENT.

1. Notice to all tenderers.
2. Standards applied in this document.

1. NOTICE TO ALL TENDERERS

This is an original document:

1. It may not be re-typed or altered in any way.
2. It must be completed in black ink (non-erasable) – in an eligible handwriting. Mistakes are to be corrected by drawing a line though it and writing the correct information above it. Tenderer to sign next to the correction. The use of erasing fluid or strips are not allowed.
3. It may not be taken apart.
4. It is not available in electronic format except PDF.
5. Bidders are required to attach returnable documents to the relative pages (where requested) and encouraged to use file fasteners and binding tape or any other similar method to ensure there are no loose pages. **Any other form of presentation (loose pages or separate documents) will not be accepted.**

2. STANDARDS APPLICABLE TO THIS DOCUMENT

Available from the S.A. Federation of Civil Engineering Contractors, the S.A. Institution of Civil Engineering and the S.A. Bureau of Standards, as applicable:

1.	CIDB	***CIDB Standard for uniformity in Construction Procurement****, 10 July 2015, as amended.*
2.	SANS 10845-1	*Processes, methods and procedures.*
3.	SANS 10845-2	*Formatting and compilation of procurement documentation.*
4.	SANS 10845-3	*Standard conditions of tender.*
5.	GCC	*General Conditions of Contract for Construction Works, Third Edition (2015) issued by the South African institution of Civil Engineering.*
6.	SANS 1200	*Standard Specifications for Civil Engineering Construction*
7.	This Document, as presented.	

CONTENTS

THE TENDER

THE CONTRACT

PART T1: TENDERING PROCEDURES

PART T2: RETURNABLE DOCUMENTS

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

PART T1 TENDERING PROCEDURES

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

Bids are hereby invited from potential services providers for the **Upgrading of Mlambongwane Water Supply Scheme**

Tender No	Description	CIDB Grading	Compulsory Meeting and Site Inspection Date	Closing Date
COM46/2023	**Upgrading of Mlambongwane Water Supply Scheme**	**5CE**	**9 June 2023 at 10h00 at the City of Mbombela Council Chamber (Barberton)** **WGS84 Coordinates** **25°46'58.0"S** **31°21'48.0"E**	**5 July 2023 at 11:00**

It is compulsory that service providers download a copy of the bid document that will ONLY be available as from 31 May 2023 on the City's website: www.mbombela.gov.za on the tenders and notices folder and National e-Tender Portal: www.etenders.gov.za, free of charge.

Duly completed bid documents and supporting documents which are, COPY OF TAX COMPLIANCE STATUS, CERTIFIED COPY OF B-BBEE CERTIFICATE OR SWORN AFFIDAVIT FOR B-BBEE TO CLAIM B-BBEE POINTS, CURRENT MUNICIPAL RATES AND TAXES CLEARANCE FROM RELEVANT LOCAL AUTHORITY OR PROOF OF RESIDENCE FROM A TRIBAL AUTHORITY OR LEASE AGREEMENT ACCOMPANIED WITH THE LESSOR'S MUNICIPAL RATES AND TAXES CERTIFICATE FOR BOTH THE COMPANY AND ITS DIRECTORS INCLUDING JV/CONSORTIUM MEMBERS, CSD REGISTRATION FULL REPORT (Summary Report will not be considered) and a copy of the COMPANY REGISTRATION CERTIFICATE, together with the bid document must be sealed in an envelope clearly marked: **"BID NO.: COM46/2023, UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME CLOSING DATE: 5 JULY 2023"** with the name of the bidder shall be placed in the bid box at MBOMBELA CIVIC CENTRE at 1 NEL STREET, MBOMBELA, before 11:00 on the closing date

Bidders are advised not to commit fraudulent activities or forge documents. All abusers of the SCM system, including forging or faking of returnable documents, may be reported to SAPS and restricted from doing business with any Public Institutions for a period NOT exceeding 10 years which is in line with section 28 and 29 of the Prevention and Combating of Corrupt Activities Act 12 of 2004.

A preferential point system shall apply whereby this contract will be allocated to a bidder in accordance with the **Preferential Procurement Policy Framework Act**, No **5 of 2000** and as defined in the conditions of bid in the bid document, read in conjunction with the Preferential Procurement Regulations, 2022, where 80 points will be allocated in respect of price and 20 points in respect of **Targeted Goals**.

Procurement Enquiries	:	Christopher Nkambule	(013) 759 2358
Technical Enquires	:	Sandile Ncongwane	(013) 759 2181
Employer	:	City Manager, City of Mbombela P. O. Box 45 1200 Mbombela	Mr. Wiseman Khumalo

VISIT OUR WEBSITE – www.mbombela.gov.za

NB: the results of this bid will be published on council's website as prescribed on section 75(1)(g) of the MFMA and section 23(c) of the SCM Regulations.

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

T1.2 TENDER DATA

The conditions of tender are the standard conditions of tender as contained in SANS 10845-3 Construction procurement, Part 3: Standard conditions of tender, that apply specifically to this tender.

The Tender Data shall be read with the Standard Conditions of Tender to expand on the Tenderer's obligations and the Employer's undertakings in administering the tender process in respect of the project under construction.

The Tender Data hereafter shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender. Each item of data given below is cross-referenced to the clause in the standard conditions of tender to which it mainly applies.

Clause Number	Data
	The conditions of tender are those contained in the latest edition of SANS 10845-3, Construction Procurement – Part 3: Standard conditions of tender. SANS 10845-3 makes several references to the Tender Data for details that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the provisions of SANS 10845-3. Each item of data given below is cross-referenced to the clause in SANS 10845-3 to which it mainly applies.
3.1	The Employer is: **City of Mbombela, 1 Nel Street, Mbombela, 1200**
3.2	The tender documents issued by the Employer comprise: **THE TENDER** **Part T1 Tendering Procedures** Part T1.1 Tender Notice and Invitation to Tender (white) Part T1.2 Tender Data (pink) Part T1.3 Preferential Procurement Policy of City of Mbombela (pink) **Part T2 Returnable Documents** Part T2.1 List of Returnable Documents (yellow) Part T2.2 Returnable Schedules to be completed by the Contractor (yellow) Part T2.3 Returnable Schedules II (yellow) **THE CONTRACT** **Part C1 Agreement and Contract Data** C1.1 Form of Offer and Acceptance (pink) C1.2 Contract Data (yellow) C1.3 Form of Guarantee (white) C1.4 Agreement in terms of Occupational Health and Safety Act, 1993 (white) C1.5 Authority for Signatory in Terms of OHS Act, 1993 (white) **Part C2 Pricing Data** C2.1 Pricing Assumptions (yellow) C2.2 Bill of Quantities and Information Sheets (yellow)

<table>
<tr><th>Clause Number</th><th>Data</th></tr>
<tr><td></td><td>
Part C3 Scope of Works
C3.1 Scope of Works (blue)
C3.2 Engineering (blue)
C3.3 Procurement (blue)
C3.4 Construction (blue)
C3.5 Management (blue)
C3.6 Health and Safety (blue)
Part C4 Site Information
C4 Site Information (green)

Appendices
Appendix A Health and Safety Specification (white)
Appendix B Drawings for Tender Purposes (white)
</td></tr>
<tr><td>3.4</td><td>
The Employer's Agent is:
Name: TFC Engineers (Pty) Ltd
Address: PostNet Suite #370
Private Bag X11326
Mbombela
1200
Tel: 013 752 7475
E-mail: info@tfce.co.za
</td></tr>
<tr><td>3.5</td><td>The language for communications is English.</td></tr>
<tr><td>3.6</td><td>The competitive negotiation procedure shall not be applied.</td></tr>
<tr><td>4.1</td><td>
Only those tenderers who satisfy the following eligibility criteria and who provide the required evidence in their tender submissions are eligible to submit tenders and have their tenders evaluated:

a) CIDB registration

Only those tenderers who are registered with the CIDB, or are capable of being so registered prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25 (1B) or 25 (7A) of the Construction Industry Development Regulations, for a 5CE or higher class of construction work, are eligible to have their tenders evaluated.

Tenderers registered as potentially emerging enterprises but with a CIDB contractor grading designation lower than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations, are not eligible to have their tenders evaluated.

For the sake of clarity and subject to satisfactory proof of a tenderer’s ability to perform the work specified at the tendered value, the Employer lists in the table below the margins it considers reasonable. However, in the event that the sum tendered exceeds the margins shown then such tender shall be deemed non-responsive.

<table>
<tr><th>Category of tender</th><th>Upper limits per CIDB Table 8 Regulation 17</th></tr>
<tr><td>5CE</td><td>R10m</td></tr>
<tr><td>6CE</td><td>R20m</td></tr>
<tr><td>7CE</td><td>R60m</td></tr>
<tr><td>8CE</td><td>R200m</td></tr>
</table>
Joint Ventures are eligible to submit bids provided that:

(1) every member of the joint venture is registered with the CIDB;
</td></tr>
</table>

Clause Number	Data
	(2) the lead partner has a contractor grading designation in the **4CE or Higher class** of construction work; and (3) the combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a **5CE or higher class** of construction work or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations. b) Key Personnel In order to be considered for an appointment in terms of this tender, the tenderer must have in its permanent employment key personnel who will be the single point accountability and responsibility for the management of the construction works. Alternatively, a signed undertaking from an organization having the required personnel, stating that they will undertake the necessary work on behalf of the tenderer in terms of a sub-contractor agreement, will be acceptable. Such undertaking must be attached to Forms T of the Returnable Schedules. Individuals must be identified for each of the key personnel listed under Forms T. Where the key personnel are no longer available to undertake the necessary work after the award of the tender, the contractor shall within a period of 14 working days replace the key personnel listed in Forms T with personnel with equivalent competencies and subject to approval by the Employer. Such approval shall not be unreasonably withheld. The key person shall be a suitably qualified and experienced contracts manager who will be the single point accountability and responsibility for the management of the construction works, and who is registered as a candidate engineer shall be required as a minimum. Where the Contracts Manager will not be employed on the Works full time, his powers will be delegated to the approved construction manager. Failure to comply with the requirements or to complete Form T may render the tender non-responsive.
4.6	**Bidders are encouraged to revisit the City's website regularly prior the closing date particularly on this project folder to ensure that all addenda/ erratum that may be issued are adhered to.** **Failure to apply instructions contained in addenda may render a tenderer's offer non-responsive in terms of Condition of Tender 5.8.**
4.7	The arrangements for the compulsory clarification meeting are as stated in the tender notice and invitation to tender. The onus rests with the tenderer to ensure that the person attending the clarification meeting on its behalf is appropriately qualified to understand all directives and clarifications given at that meeting. The clarification meeting shall start strictly at the time advertised. Only then will the Employer's Representative circulate the attendance register for completion by those present. During this time latecomers may enter and complete the register. On completion by all present the Employer's Representative will: (a) read out from the collected lists calling for confirmation that all have signed; The signature on the attendance register and duly completed and signed Form A shall be considered proof that the tenderer attended the whole meeting and was available to hear all directives and clarifications given at the meeting. Tenderers must sign the attendance list in the name of the tendering entity. Addenda will be issued to and tenders will be received only from those tendering entities appearing on the attendance list.

Clause Number	Data
4.8	**Request clarifications at least 7 working days before the closing time.**
4.10	Tenderers are required to state the rates and currencies in Rand.
4.12	An alternative tender offer will only be considered if a main tender offer, strictly in accordance with all the requirements of the tender documented is also submitted. If the tenderer wishes to submit an alternative tender offer, the only criteria permitted for such alternative tender offer is that it demonstrably satisfies the Employer's standards and requirements, the details of which may be obtained from the Employer's Agent. Calculations, drawings and all other pertinent technical information and characteristics as well as modified or proposed Pricing Data must be submitted with the alternative tender offer to enable the Employer to evaluate the efficacy of the alternative and its principal elements, to take a view on the degree to which the alternative and to evaluate the acceptability of the pricing proposals. Calculations must be set out in a clear and logical sequence and must clearly reflect all design assumptions. Pricing Data must reflect all assumptions in the development of the pricing proposal. Acceptance of an alternative tender offer will mean acceptance in principle of the offer. It will be an obligation of the contract for the tenderer, in the event that the alternative is accepted, to accept full responsibility and liability that the alternative offer complies in all respects with the Employer's standards and requirements. The modified Tender Data must include an amount equal to 5% of the amount tendered for the alternative offer to cover the Employer's costs of confirming the acceptability of the detailed design before it is constructed.
4.13.1	Parts of each tender offer communicated on paper shall be submitted as an <u>original</u>, no copies required. The signed print-out shall be taken as the valid submission.
4.13/4.15	The Employer’s address for delivery of tender offers and identification details to be shown on each tender offer package are: Location of tender box: City of Mbombela Physical address: 1 Nel Street, Mbombela 1200 Identification details: **Bid COM46/2023, Upgrading of Mlambongwane Water Supply Scheme** Tenders can be submitted 24 hours a day from Monday to Friday at the Employer’s address. It is in the tenderer’s interest to ensure that the delivery of the tender offer is recorded in the Employer’s tenders received register.
4.13.4	The tenderer is required to submit all certificates as listed in the Schedule of Tender Compliance (Form U).
4.13.5	Place and seal the printed and completed tender document in an envelope clearly marked “TENDER” and bearing the Employer’s name, the contract number and description, the tenderer’s authorised representative’s name, the tenderer’s postal address and contact telephone numbers.
4.13.5	A two-envelope procedure will not be followed.
4.13.6	Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted.
4.15	The closing time for submission of tender offer is as stated in the Tender Notice and Invitation to Tender.
4.16.1	The tender offer validity period is 120 days.

Clause Number	Data
4.16.2	Where a tenderer, at any time after the opening of his tender offer but prior to entering into a contract based on his tender offer: a) withdraws his tender; b) gives notice of his inability to execute the contract in terms of his tender; or c) fails to comply with a request made in terms of 4.17, 4.18 or 5.9, such tenderer shall be barred from tendering on any of the Employer's future tenders for a period to be determined by the Employer, but not less than six (6) months, from the date of tender closure. The Employer may fully or partly exempt a tenderer from the provisions of this condition if he is of the opinion that the circumstances justify the exemption.
4.18	Any additional information requested under this clause must be provided within 5 (five) working days of date of request.
4.20	The tenderer is required to submit with his tender a letter of intent from an approved insurer undertaking to provide the Performance Bond to the format included in Part C1.8 of this procurement document.
5.1	The employer shall respond to clarifications received up to 7 working days before tender closing time.
5.2	The employer shall issue addenda until 5 working days before tender closing time.
5.4	All bid responses must be submitted before the Bid Closing date and time as stipulated on the tender invitation.
5.7	In the event of disqualification, the Employer may, at its sole discretion, impose a specified period during which tender offers will not be accepted from the offending tenderer and report same to CIDB and National Treasury.
5.9	Arithmetical errors, omissions, discrepancies, and imbalanced unit rates Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount appearing in the summary to the Pricing Schedule shall govern. Check responsive tender offers for: a) the gross misplacement of the decimal point in any unit rate; b) omissions made in completing the pricing schedule or bills of quantities; or c) arithmetic errors in: i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or ii) the summation of the prices. d) imbalanced unit rates. Notify shortlisted tenderers of all errors, omissions or imbalanced rates that are identified in their tender offers. Where the tenderer elects to confirm the errors, omissions, or re-balancing of imbalanced rates the tender offer shall be corrected as follows: a) If bills of quantities or pricing schedules apply and there is an error in the line-item total resulting from the product of the unit rate and the quantity, the unit rate shall govern, and the line-item total shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line-item total as quoted and the unit rate shall be corrected. b) Where there is an error in the total of the prices either because of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall be corrected. c) Where the unit rates are imbalanced adjust such rates by increasing or decreasing them and selected others while retaining the total of the prices derived after any other corrections made under (a) and (b) above. Where there is an omission of a line item, no correction is possible, and the offer may

Clause Number	Data
	be declared non-responsive. Declare as non-responsive and reject any offer from a tenderer who elects not to accept the corrections proposed and subject the tenderer to the sanction under 4.16.2. The tenderer is required to submit balanced unit rates for rate only items in the pricing schedule. The rates submitted for these items will be taken into account in the evaluation of tenders.
5.10	**List of disqualifying factors of this tender are as follows:** A bid not complying with the requirements stated hereunder will be regarded as "Non Responsive", and as such will be rejected/disqualified for further evaluation • Submit company registration certificate • Submit Tax Compliance Status issued by SARS • Full CSD report **NOT older than 30 days** from the closing date, Summary report will **NOT** be considered • Submit Joint venture agreement in case of JV. All parties are expected to attach their individual returnable documents except for consolidated B-BBEE certificate and combined CIDB grading. • Authority for Signatory, duly signed and dated original or certified copy on the Company(s) Letterhead. This condition will not apply to companies owned by one director / member / sole proprietor if he/she is a signatory for his/her own business. • Submit copies of relevant Annual Financial Statements (last 3 Financial Years Consecutively). For JV/Consortium, relevant Annual Financial Statements from all parties are required. Failure to provide for all the service Providers will results in disqualification. • Submit copy of an active CIDB contractor grading designation of 5CE or higher. For JV, a combined CIDB grading is required. • Tenderer must provide valid copies of current municipal rates and taxes certificates from relevant local authority / proof of residential from tribal authority (if the business is operating or the directors are residing in rural areas) / lease agreement with the lessor's current municipal rates and taxes for both the company and for the active directors including JV/Consortium partners. Prospective bidders should ensure that the physical address details of the company and directors reflected on the CSD is similar to the one reflected on the company registration certificate. The municipality reserves the right to verify both the municipal rates and taxes of the company details reflected on the CSD and company registration certificates. The municipality further reserves the right to use ID numbers of the directors to verify if any municipal rates and taxes are not owned by each director. It is prudent and remains the responsibilities of the prospective bidders to ensure that each director, lessor and company rates are cleared with regards to the municipal rates and taxes. A bid will be rejected if any municipal rates and taxes owed by the bidder or any of its directors to the municipality, or to any other municipality or municipal entity, are in arrears for more than three months. • Letter of good standing for COIDA. The letter of good standing must reflect the relevant nature of business as prescribed on The Compensation for Occupational Injuries and Diseases Act 130 of 1993. Must also be in line with the required CIDB Grading. • Letter of Intent for Public Liability Insurance for 10% of the value of contract sum. The letter must be issued by a registered insurance service provider. The letter should have the full contact details of the service provider and the underwriter. • Letter of intent for performance guarantee from a registered Financial Service Provider (FSP). The letter should have the full contact details of the service provider and the FSP number. • All certificates, appointment letters of company experience, completion certificates of company experience, proof of ownership on plant and equipment, qualification certificates of personnel with Identity Documents must be certified by the

Clause Number	Data
	commissioner of Oaths, RSA. It must have date of certification and not older than 3 months. A copy of a certified copy will not be accepted. • Fully completed and signed where applicable in the Returnable Schedules. • Failure to apply instructions contained in addenda that may be issued. • Submissions from bidders who did not attend a compulsory briefing session will not be acceptable. • Prospective service providers may not make any alterations or additions to the Bid document, except to comply with instructions issued by the employer. The tender document must be furnished with non-erasable black ink and all corrections made by the service provider should be dated and signed by the authorized signatory. Erasures and the use of masking fluid, tippex, pencil or erasable ink are prohibited and failure to adhere to this condition will render your submission non responsive.
5.11	The procedure for the evaluation of responsive tenders is Method 2: Functionality, Price and preferences. Method 2 Functionality offer , Price and preferences is scored as follows: a) Score each tender in respect of the financial offer made and preferences claimed, if any. b) Calculate the total number of tender evaluation points (TEV) in accordance with the following formula: $T_{EV} = N_{FO} + N_P + N_Q$
5.11.5	where: N_{FO} is the number of tender evaluation points awarded for the financial offer made in accordance with F.3.11.7; N_P is the number of tender evaluation points awarded for preferences claimed in accordance with F.3.11.8. N_Q is the number of tender evaluation points awarded for quality claimed in accordance with F.3.11.9. • Rank tender offers from the highest number of tender evaluation points to the lowest. • Recommend the tenderer with the highest number of tender evaluation points for the award of the contract, unless there are compelling and justifiable reasons not to do so. • Rescore and re-rank all tenderers should there be compelling and justifiable reasons not to recommend the tenderer with the highest number of tender evaluation points, and recommend the tenderer with the highest number of tender evaluation points, unless there are compelling and justifiable reasons not to do so and the process set out in this sub-clause is repeated. • Compelling and justifiable reasons not to recommend a tenderer are inter alia tenderers who: ○ do not meet the minimum requirements listed in Part T2.1, List of Returnable Documents and/or • failed to complete the tender document comprehensively with all the required information.
5.11.7	The financial offer will be scored using the following formula: $N_{FO} = W_1 \times A$ Where: N_{FO} = the number of evaluation points awarded for the financial offer W_1 = the maximum possible number of bid evaluation points awarded for the financial offer and will be: (i) 90 where the financial value inclusive of VAT of all responsive tenders received have a value more than R 50,000,000; or

<table>
<tr><th>Clause Number</th><th>Data</th></tr>
<tr><td></td><td>
(ii) 80 where the financial value inclusive of VAT of one or more responsive tender offers equal or is less than R 50,000,000.
A = the number calculated using Formula 2 (Option 1)
Table 1: Formulae for calculating the value of A_a
<table>
<tr><th>Formula</th><th>Comparison aimed at achieving</th><th>Option 1[a]</th><th>Option 2[a]</th></tr>
<tr><td>1</td><td>Highest price or discount</td><td>$A = (1 + \frac{(P - P_m)}{P_m})$</td><td>$A = P / P_m$</td></tr>
<tr><td>2</td><td>Lowest price or percentage commission /fee '</td><td>$A = (1 - \frac{(P - P_m)}{P_m})$</td><td>$A = P_m / P$</td></tr>
</table>
[a] P_m is the comparative offer of the most favourable comparative offer.
P is the comparative offer of the tender offer under consideration
</td></tr>
</table>

<table>
<tr><th>Clause Number</th><th>Data</th></tr>
<tr><td>5.11.8</td><td>
Scoring preferences.

Up to 100 minus W1 tender evaluation points will be awarded to tenderers who submit responsive tenders and who are found to be eligible for the preference claimed. Points are based on a tenderer’s scorecard measured in terms of the Regulations (2022) to the Preferential Procurement Policy Framework Act (PPPFA, Act 5 of 2000).

Points awarded will be according to a tenderer’s specific goals summarized in the table below:

<table>
<tr><th>Item No.</th><th>The specific goals allocated points in terms of this tender</th><th>Number of points allocated (80/20 system)</th><th>Number of points allocated (90/10 system)</th></tr>
<tr><td>1.</td><td>100% Black owned enterprises within the definition of the HDI</td><td>2</td><td>1</td></tr>
<tr><td>2.</td><td>At least 30% women owned enterprises</td><td>2</td><td>1</td></tr>
<tr><td>3.</td><td>At least 30% youth owned enterprises</td><td>2</td><td>1</td></tr>
<tr><td>4.</td><td>At least 30% enterprises people living with disabilities</td><td>2</td><td>1</td></tr>
<tr><td>5.</td><td>Enterprises regarded as EMEs located within the City of Mbombela</td><td>2</td><td>1</td></tr>
<tr><td>6.</td><td>Enterprise who will sub-contract minimum of 30% of the contract value to EME’s in the ward or local communities where the services to be rendered of works to be undertaken (Bidders shall list sub-contracting works or items)</td><td>2</td><td>1</td></tr>
<tr><td>7.</td><td>Corporate Social Investment (CSI) Plan. (see notes below)</td><td>5</td><td>3</td></tr>
<tr><td>8.</td><td>B-BBEE level 1 contribution (SANAS verified B-BBEE certificate for generic enterprise, and for EME and SME a sworn affidavit or CIPC issued certificate confirming annual turnover and level of Black Ownership</td><td>3</td><td>1</td></tr>
<tr><td colspan="2">Total</td><td>20</td><td>10</td></tr>
</table>
Eligibility for preference points will be determined as follows:
□Compliance with any other information requested to be attached to Returnable Schedule Form D.□
</td></tr>
<tr><td>5.11.9</td><td>
The quality criteria and maximum score in respect of each of the criteria are as follows:
<table>
<tr><th>Description of quality criteria</th><th>Maximum number of points</th></tr>
<tr><td>Plant and equipment</td><td>15</td></tr>
<tr><td>Key Personnel</td><td>25</td></tr>
<tr><td>Financial Reference</td><td>10</td></tr>
<tr><td>Company Experience</td><td>50</td></tr>
<tr><td>Total evaluation points for quality (Ms)</td><td>100</td></tr>
</table>
</td></tr>
</table>

Clause Number	Data
	Tender offers will only be considered responsive if the minimum quality requirement of **70 points** is achieved. Tenderers are required to demonstrate their ability to undertake the work and provide proof of previous experience, expertise and availability of plant and equipment to undertake a project of this nature. Tenderers are therefore required to meet a minimum Quality Score of 70% (70 points out of 100) based on the criteria listed below. A score of less than 70 out of 100 points for Quality will render the tender non-responsive. The onus rests with the Tenderer to supply sufficient information to allow for evaluation and award of points detailed below. If insufficient information is provided, zero points will be awarded for that particular item. Note that Quality points are only used to determine responsiveness and will not be used further in the evaluation. i). Plant and Equipment (Maximum 15 points) Details of owned and hired plant and equipment are to be entered in Form R of the Returnable Schedules. ii). Key Personnel (Maximum 25 points) Details of key personnel and their experience and qualifications are to be entered in Form T of the Returnable Schedules. iii). Water and Concrete Reservoir Construction Experience (Maximum 50 points) Details of paved surface roads related projects & supporting information in terms of the points to be claimed in terms of quality, must be entered in Form Q in the Returnable Schedule. iv) Financial Reference (Form S) for bank rating (Maximum 10 points)
5.13	**In addition to the requirements of the Condition of Tender, offers will only be accepted if:** • the tenderer is registered on the Central Supplier Database (CSD) for the South African government (see https://secure.csd.gov.za/). CSD is compulsory for any company to bid. The full report should be submitted, not the summary. • the tenderer is in good standing with SARS according to the Central Supplier Database. • the tenderer submits an Original letter of intent from an approved insurer undertaking to provide the Performance Bond to the format included in Form S of this procurement document. • the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation. • the tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector; • the tenderer has not: • abused the Employer's Supply Chain Management System; or • failed to perform on any previous contract and has been given a written notice to this effect; • the tenderer has completed the Compulsory Declaration and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the employer or potentially compromise the tender process; • the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer; • the employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2003, issued in terms of the Occupational Health and

Clause Number	Data
	Safety Act, 1993, the necessary competencies and resources to carry out the work safely. • No Tippex has been used on the bid document. • The tenderer has not used an erasable pen and completed the bid document with a pencil.
5.17	The number of paper copies of the signed contract to be provided by the employer is **One.**
5.19	All requests shall be in writing.

CHECKLIST FOR RETURNABLE DOCUMENTS STIPULATED UNDER SPECIAL CONDITIONS OF TENDER DOCUMENTS AS MANDATORY REQUIREMENTS. THIS DOCUMENT SHALL BE APPLICABLE TO ALL TENDER DOCUMENTS OF THE CITY.

Preamble

The objective of this checklist is aimed at ensuring that interpretation and application of the special conditions and other mandatory requirements at Bid Evaluation Committee (BEC) & Bid Adjudication Committee (BAC) are aligned as envisaged by the Bid Specification Committee (BSC). This will enhance consistency and uniformity in the entire bid committee system whilst promoting "user friendly" principles by simplifying tender requirements to all interested prospective bidders.

ITEM NO:	DESCRIPTION / RETURNABLE DOCUMENTS	NOTES	FOR OFFICE USE ONLY	
			CHECKLIST	YES or NO or N/A
	Company Registration Certificate	It's a certificate issued by the Companies and Intellectual Property Commission in line with section 14 of the Companies Act 78 of 2008 A Certificate issued by CIPRO in line with section 2 of the Close Corporation Act 69 of 1984 NB: The registration of Close Corporations (CCs) was replaced by introduction of the New Companies Act which came to effect in April 2011. CCs to be recognized as valid registration certificate will be up to 2010.	Has the bidders attached a valid company registration document in line with the applicable legislation?	
	Company Profile	A Company Profile is a professional introduction of your Business that aims to inform Clients about its purpose, vision, trustworthiness, products and services, and experience of your Company. It is basically a "CV for your Business/Company"	Has the bidder attached a company profile and its experience is relevant to add value on this project?	

	Certification of documents to be submitted together with the tender document. I.e. ID Copies of business owners, qualifications, Licenses and certificates, accreditation by professional bodies, proof of ownership document, appointment letters, completion certificates, etc.	The certification of documents must be done by a commissioner of oath as prescribed in the Justices of the Peace and Commissioners of Oaths Act 16 of 1963 and its Regulations. Acceptable certified copies are copies originally certified from any police station, post office, Lawyers or notary public (who are members of a recognised professional body), Actuaries or accountants (who are members of a recognised professional body), Members of the judiciary, Directors, managers or company secretaries of a banks or regulated financial services business. *Commissioner of Oaths stamps can be purchased at Stationary shops, but it can be custom made following the below example:* CERTIFIED TRUE COPY OF THE ORIGINAL DOCUMENT. THERE ARE NO INDICATIONS THAT THE ORIGINAL DOCUMENT HAS BEEN ALTERED BY UNAUTHORISED PERSONS. Designation (rank) ……ex officio: RSA Date: …… Place …… Business Address: …… …… Commissioner of Oaths …… Signature Full Names NB: All certified copies must NOT exceed three months and be originally certified.	Has the bidder certified all documents to be certified as per special conditions of bid? Check validity on the date, check if the commissioner of oaths stamp is compliant as per example copied from the Regulations.	
	Central Supplier Database (CSD) Full report, (Summary report will **NOT** be acceptable). **N/B CSD Report date should not be more than 30 days before Bid closing date.**	The City requires that all prospective bidders should be registered on CSD. This is aimed at verification of email addresses, phone numbers, banking details, company registration numbers, tax status with SARS, state employees, etc.	Has the bidder attached a full CSD report, are tax matters in good order, are the directors not in the employment of any state and the CSD report is not older than 30 days from	

			the closing date?	
	Tax Compliant Status (TCS)	Prospective bidders are required to attach a valid TCS together with the tender document.	Has the bidder attached a valid (not expired) TCS? The designated official should verify the bidder's tax compliance status prior to finalization of the award of a bid or prize quotation. Where the recommended bidder is not tax compliant, the bidders should be notified of their non-compliant status and the bidder must be requested to submit to the City within 7 working days, written proof from SARS of their tax compliance status or proof from SARS that they have made arrangements to meet their outstanding tax obligations. The proof of tax compliance status submitted by the bidder to the City must be verified via the CSD report or e-Filing. The City should	

			reject a bid submitted by the bidder if such a bidder fails to provide proof of tax compliance status within the timeframe stated above **(See MFMA Circular No: 90).**	
	Certified copy of B-BBEE Certificate / affidavit for B-BBEE status level of contributor (**to claim points only).**	EMEs in terms of the B-BBEE Act 53 of 2003 may submit a sworn affidavit confirming annual total revenue and level of black ownership or Certified Copy of B-BBEE Certificate. Bidders other than EMEs and QSEs **MUST** submit their certified copies of valid B-BBEE status level verification certificate, substantiating their B-BBEE rating issued by a registered auditor approved by IRBA or a verification agency accredited by SANAS. A trust, consortium or joint venture will qualify for points for their B-BBEE status level as an unincorporated entity, provided that the entity submits their consolidated B-BBEE scorecard as if they were a group structure and that such a consolidated B-BBEE scorecard is prepared for every separate bid. NB: There is NO consolidated affidavit for B-BBEE status level of contributor. Only consolidated B-BBEE certificate will be considered for JVs / Consortium & large companies that are making an annual turnover in access of R50 million including value added tax (VAT). *This is not a disqualifying factor, non-adherence will lead to no allocation of B-BBEE points.*	Is the copy B-BBEE Certificate valid? Is the sworn affidavit for EME / QSE in line with the threshold for EME and EME and valid? If the tendering entity is a JV / Consortium / Large company, has the bidder attached a certified copy of a valid and consolidated B-BBEE certificate in order to claim points as prescribed by the MSCM Regulations? Is the copy of B-BEE certificate certified by the Commissioner of Oaths reflects as prescribe on the regulations of the Act? Is the affidavit for B-BBEE stamped and signed by commissioner of oaths? I.e. full names and signature, force/practice	

			number, designation / rank, date and address. Is the certification date not older than 3 months and original ink is clear on the document to confirm if it is originally certified?	
	Formal agreement must be attached in case of a joint venture (JV) or consortium.	The JV/consortium must amongst others, reflect clear profit and loses sharing percentages. It is compulsory that the lead partner must have at least 51% majority shares in the JV/consortium.	If the tendering entity / bidder is a JV/Consortium, has the bidder attached a detailed JV/Consortium agreement with all critical information?	
	In bids where Consortia / Joint Ventures / Sub-contractors are involved, each party must submit separate required returnable documents.	This will not be applicable to functionality and B-BBEE requirements.	If the tendering entity / bidder is a JV/Consortium, have the parties involved attached all individual required documents as per special condition of bid?	
	Latest municipal rates and taxes certificates from relevant local authority for the business and all business directors OR Proof of resident from tribal authority for the business and all business directors OR Lease agreement with the Lessor's latest municipal rates and taxes certificates from relevant local authority.	If the business is operated and its director(s) are residing within a municipal area, bidders are expected to attach latest municipal rate and taxes certificates for the business and ALL its directors. If the business is operated and its director(s) are residing within a tribal authority. Bidders are expected to attach proof of resident for the business and ALL its directors. If the business directors are leasing a facility for residential purposes, they are required to attach individual lease agreement with lessor's latest municipal rates and taxes for a facility is within a Municipal boundary and if the business is renting office / business facility, the bidders are required to attach lease agreement for the business with lessor's latest	Has the bidder attached latest municipal rates and taxes from relevant local authority for the company / business and all company directors / owners? In case of lease, has the bidders attached lease agreements and lessor's proof of res from a tribal authority or latest municipal rates and taxes certificate?	

	NB: All accounts owing any municipality for more than 90 days will be disqualified as prescribed on the MSCM Regulations.	municipal rates and taxes for a facility within a municipal boundary. If the facility leased is in a rural area, lease agreement will be accompanied with the lessor's proof of residential from a tribal authority. NB: *Domicilium citandi at executandi*: Domicilium citandi et executandi is a Latin legal term meaning the address nominated by a bidder in a legal contract where legal notices may be sent. Bidders are encouraged to update their addresses when they relocate their businesses and the preferred address on the CSD should be in line with the address on the Company Registration Document. It is the responsibility of the bidder to ensure that all physical addresses reflected either on the company registration document and CSD are not owing any municipal rates and taxes for more than three months including the Lessor's municipal account in case of lease. The rationale behind this requirement is the enhance revenue in RSA municipalities as enshrined on the Municipal Systems Act 32, 2000. Failure to attach is an immediate disqualification but failure to align addresses will not be a disqualifying factor, however all addresses reflected on the both the CSD and company registration document will be subjected to this requirement.	Is the account not in areas for more than 90 days (3 months)?	
.	**Forging of documents/certificates** The City has noted that prospective bidders are allegedly submitting fraudulent and forged documents when bidding for tenders. Bidders are advised not to commit fraudulent activities and forge documents. The City will ensure that this Act is adhered to by reporting all abusers of the SCM system to SAPS and enlist them on the Register of	Section 34(1)(b) of the Prevention and Combating of Corrupt Activities Act 12 of 2004, stipulates that: *"any person who holds a position of authority and who knows or ought reasonably to have known or suspected that any other person has committed the offence of theft, fraud, extortion, **forgery** or uttering a forged document involving an amount of R100 000 or more, must report such knowledge or suspicion or cause such knowledge or suspicion to be reported to any police official".* Section 34(2) of the same Act stipulates that: *"subject to the provision of section 37(2), any person who fails to comply with*	Are there any suspicious / alleged fraudulent or forged documents? If yes, has the matter been reported to the nearest SAPS following correct institutional protocol? Has the matter been registered with the Registrar to enable due processes and per the	

	Tender Defaulters as prescribed on section 29 of the Prevention and Combating of Corrupt Activities Act 12 of 2004. Abusers of the SCM system, amongst other penalties, may be restricted to do business with any Public Institutions for a period NOT exceeding 10 years (**see section 28 of this Act**).	*subsection (1), is guilty of an offence".*	Act? NB: The minutes of the BEC / BAC should detail all the elements of alleged fraud and forged documents.	
.	Copy of Public Liability insurance. Only insurance covers from registered and authorized financial service providers will be accepted.	Public liability insurance may vary from one project to another on the basis of the level of risk and complexity of the project. Minimum cover to be determined by the BSC prior consultation with the project manager if deemed necessary.	If applicable, is the bidder compliant with the minimum cover stipulated in the bid document? Is the public liability insurance from a registered financial institution?	
.	Recent audited / independently reviewed financial statements for three consecutive years. NB: if a company provides any financial statements in terms of section 29 of the Companies Act, such statements must comply with the provision of the Act.	Applicable to private companies that are not managed by its owners, if: It compiles its financial statement internally and its public interest score is less than 100. It has its financial statements compiled independently and its public interest score is between 100 and 349. the public interest score is 350 points or more, is required for an audit to be conducted.	Has the bidder furnished MBD 5 as mandatory for all projects estimated to be in excess of R10 million? Has the bidder attached the relevant AFS as required by law and is it aligned with his/her declaration on MBD 5? False / mismatched / inconsistent declaration may lead to immediate disqualification.	
.	Recent annual financial statement (AFS) for three consecutive years (unaudited AFS).	Applicable to private companies with a public interest score of less than 100. If, with respect to a particular company, every person who is a	Has the bidders furnished MBD 5 as mandatory? Has the bidder attached	

	NB: if a company provides any financial statements in terms of section 29 of the Companies Act, such statements must comply with the provision of the Act.	holder of, or has a beneficial interest in, any securities issued by that company is also a director of the company, that company is exempt from the requirements in this section to have its annual financial statements audited or independently reviewed. NB: An independent review will suffice if the company has opted to have its financial statement audited or is required by its Memorandum of Incorporation (MOI) to do so.	the relevant AFS as required by law in line with his/her declaration on MBD 5?	
.	Functionality / Quality for evaluation of complex projects	Functionality test refers to evaluation of bidders on various aspects of the contract to establish if the bidders has the capabilities to execute the contract or not. The various aspect may include but not limited to: track record and experience on similar projects, human resource and their individual experience, financial capabilities, relevant technology, etc. NB: Functionality will not be compulsory for all projects but for complex projects. Functionality criteria will vary from one project to another.	Has the bidder met the minimum threshold on functionality in order to qualify for further evaluation on price and B-BBEE? Has the bidders been scored in line with the evaluation criteria set on the tender document? All portfolio of evidence attached and certified as stated on the bid document?	
.	The Compensation for Occupation Injuries and Diseases Act 130 of 1993 (COIDA)	The COIDA provides for compensation for disablement caused by occupational injuries or diseases sustained or contracted by employees in the course of their employment, or for death resulting from such injuries or diseases, hence bidders are expected to attach COIDA certificates in line with their specialize area aligned to the type/nature of business.	If applicable, is the COIDA certification / letter of good standing attached, valid and reflects the nature of work in line with the scope of works?	

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

PART T2 RETURNABLE DOCUMENTS

PART T2: RETURNABLE DOCUMENTS

1. Failure to fully complete the **compulsory** returnable documents shall render such a tender offer unresponsive.
2. Tenderers shall note that their signatures appended to each returnable form **represents a declaration that they vouch for the accuracy and correctness of the information provided**, including the information provided by candidates proposed for the specified key positions.
3. Notwithstanding any check or audit conducted by or on behalf of the Employer, the information provided in the returnable documents is accepted in good faith and as justification for entering into a contract with a tenderer. **If subsequently any information is found to be incorrect such discovery shall be taken as wilful misrepresentation by that tenderer to induce the contract**. In such event the Employer has the discretionary right under contract condition 9.2 to terminate the contract.

The Tenderer must complete the following returnable Schedules:

Returnable Schedules required for Tender evaluation purposes

COMPULSORY TENDER DOCUMENTS	
FORM A	CERTIFICATE OF ATTENDANCE AT CLARIFICATION MEETING
FORM B	RECORD OF ADDENDA TO TENDER DOCUMENTS
FORM C	PROPOSED AMENDMENTS, QUALIFICATIONS AND ALTERNATIVES
FORM D	PREFERENCING SCHEDULE: BROAD BASED BLACK ECONOMIC EMPOWERMENT STATUS
FORM E	COMPULSORY DECLARATION
FORM F	MUNICIPAL DECLARATION AND RETURNABLE DOCUMENTS
FORM G	CERTIFICATE OF INDEPENDENT TENDER
FORM H	DECLARATION OF GOOD STANDING REGARDING TAX
FORM I	DECLARATION OF TENDERER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES
FORM J	REGISTRATION ON NATIONAL TREASURY CENTRAL SUPPLIER DATABASE
FORM K	DECLARATION OF TENDERER'S LITIGATION HISTORY
FORM L	AUTHORITY OF SIGNATORY
FORM M	SCHEDULE OF SPECIALIST SUBCONTRACTORS
FORM N	PROOF OF GOOD STANDING WITH COMPENSATION COMMISSIONER
FORM O	SCHEDULE OF CURRENT COMMITMENTS
FORM P	REGISTRATION WITH CIDB
RETURNABLE FOR QUALITY CRITERIA	
FORM Q	COMPANY EXPERIENCE IN RELATION TO SCOPE OF WORKS
FORM R	PLANT & EQUIPMENT
FORM S	FINANCIAL RESOURCES
FORM T	KEY PERSONNEL, EXPERIENCE AND QUALIFICATIONS
CERTIFICATE FOR TENDER COMPLIANCE	
FORM V	SCHEDULE OF TENDER COMPLIANCE

COMPULSORY TENDER DOCUMENTS

FORM A: CERTIFICATE OF ATTENDANCE AT CLARIFICATION MEETING

Notes to Tenderer:

1. Unless the attendee's name, details and signature also appear on the attendance register this Certificate of Attendance shall not be accepted and the tenderer's offer shall be deemed non-responsive.

This is to certify that I, ...

representative of (tenderer) .....

of (address) .....

.....

.....

telephone number .....

fax number .....

e-mail .....

attended the clarification meeting on (date) .....

Signature of Representative: _____

Signature of Project Manager: _____

FORM B: RECORD OF ADDENDA TO TENDER DOCUMENTS(SIPDM)

We confirm that the following communications received from the Employer before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer:

	Date	Title or Details
▪		
▪		
▪		
▪		
▪		
▪		
▪		
▪		
▪		
▪		

Attach additional pages if more space is required.

Signed _____ Date _____

Name _____ Position _____

FORM C: PROPOSED AMENDMENTS, QUALIFICATIONS AND ALTERNATIVES(SIPDM)

The Tenderer should record any deviations or qualifications he may wish to make to the tender documents in this Returnable Schedule. Alternatively, a tenderer may state such deviations and qualifications in a covering letter to his tender and reference such letter in this schedule.

The Tenderer's attention is drawn to clause 5.8 of SANS 10845-3 regarding the employer's handling of material deviations and qualifications.

(a) AMENDMENTS

Page, Clause or Item No	Proposed Amendment

Note: (1) Amendments to the General and Special Conditions of Contract are not acceptable;
(2) The Tenderer must give full details of all the financial implications of the amendments and qualifications in a covering letter attached to his tender.

(**This is not an invitation for alternatives** but should the Tenderer desire to make any departures for the provisions of this contract he shall set out his proposals clearly hereunder.

(b) ALTERNATIVES

Proposed Alternative	Description of Alternative

Note: (1) Individual alternative items that do not justify an alternative tender, and an alternative offer for time for completion should be listed here
(2) In the case of a major alternative to any part of the work, a separate Bill of Quantities, programme, etc. and a detailed statement setting out the salient features of the proposed alternatives must accompany the tender
(3) Alternative tenders involving technical modifications to the design of the works and methods of construction shall be treated separately from the main tender offer.

Signed _____ Date _____

Name _____ Position _____

FORM D: PREFERENTIAL PROCUREMENT REGULATIONS 2022

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

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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 **To be completed by the organ of state**

a) The applicable preference point system for this tender is the 80/20 preference point system.

1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:

(a) Price; and

(b) Specific Goals.

1.4 **To be completed by the organ of state:**

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	80
SPECIFIC GOALS	20
Total points for Price and SPECIFIC GOALS	**100**

1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.

1.6 The organ of state reserves the right to require of a 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:

80/20 **or** **90/10**

$$Ps = 80\left(1 - \frac{Pt - P\,min}{P\,min}\right) \quad \text{or} \quad Ps = 90\left(1 - \frac{Pt - P\,min}{P\,min}\right)$$

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:

80/20 **or** **90/10**

$$Ps = 80\left(1 + \frac{Pt - P\,max}{P\,max}\right) \quad \text{or} \quad Ps = 90\left(1 + \frac{Pt - P\,max}{Pmax}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = Price of highest acceptable tender

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 below 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 1: 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.*)**

Item no.	The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system)	Number of points claimed (90/10 system)
1.	100% Black owned enterprises within the definition of the HDI	**2**	**1**
2.	At least 30% women owned enterprises	**2**	**1**
3.	At least 30% youth owned enterprises	**2**	**1**
4.	At least 30% enterprises people living with disabilities	**2**	**1**
5.	Enterprises regarded as EMEs located within the City of Mbombela	**2**	**1**
6	Enterprise who will sub-contract minimum of 30% of the contract value to EME's in the ward or local communities where the services to be rendered of works to be undertaken (Bidders shall list sub-contracting works or items)	**2**	**1**
7	Corporate Social Investment (CSI) Plan. (see notes below)	**5**	**3**
8	B-BBEE level 1 contribution (SANAS verified B-BBEE certificate for generic enterprise, and for EME and SME a sworn affidavit or CIPC issued certificate confirming annual turnover and level of Black Ownership	**3**	**1**
	TOTAL	**20**	**10**

The City will utilize the CSD report for the above-mentioned information

Corporate Social Investment (CSI)

NB: The minimum total value of the CSI should not be less than 2% of the total project value excluding vat and contingencies. The CSI project should be delivered concurrently with the project. The final product should be delivered prior to the issuing of completion certificate. The nature of the CSI project must benefit the community at large. (1 page, Arial font size 12) Prospective bidders will be expected to provide the City with a written explanation on how to implement the Corporate Service Investment on that particular ward, community or region. The investment must benefit the community at large. In order to claim points, a detailed one page report must be included in the list of returnable documents. The corporate social investment initiates must be implemented by the company/successful bidder. The final details of the CSI project will be finalized prior to the signing of the contract in consultations with relevant stakeholders.

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
- □ State Owned Company

[TICK APPLICABLE BOX]

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:	……
	……
	……
	……

4 Declaration

The tenderer declares that

a) the tendering entity is a level contributor as stated in the submitted evidence of qualification as at the closing date for submissions

b) the tendering entity has been measured in terms of the following code (tick applicable box)

□ Generic code of good practice

□ Other – specify .....

c) the contents of the declarations made in terms of a) and b) above are within my personal knowledge and are to the best of my belief both true and correct

The undersigned, who warrants that he / she is duly authorized to do so on behalf of the tenderer, confirms that he / she understands the conditions under which such preferences are granted and confirms that the tenderer satisfies the conditions pertaining to the granting of tender preferences.

Signature: .....

Name: .....

Duly authorized to sign on behalf of: .....

Telephone: .....

Fax: ..... Date: .....

Name of witness ..... Signature of witness .....

Note:

1) Failure to complete the declaration will lead to the rejection of a claim for a preference.
2) Supporting documentation of the abovementioned claim for a preference must be submitted with the tender submission to be eligible for a preference. (see Clause 5.11.8 in Tender Data)

FORM E: COMPULSORY DECLARATION (SIPDM) (MBD 4)

The following particulars must be furnished. In the case of a joint venture, separate declaration in respect of each partner must be completed and submitted.

Section 1: **Enterprise Details**

Name of enterprise:	
Contact person:	
Email:	
Telephone:	
Cell no	
Fax:	
Physical address	
Postal address	

Section 2: Particulars of companies and close corporations

Company / Close Corporation registration number	

Section 3: SARS Information

Tax reference number	
VAT registration number:	*(State Not Registered if not registered for VAT)*

Section 4: CIDB registration number

CIDB Registration number *(if applicable)*	

Section 5: National Treasury Central Supplier Database

Supplier number	
Unique registration reference number	

Section 6: Particulars of principals

principal: means a natural person who is a partner in a partnership, a sole proprietor, a director of a company established in terms of the Companies Act of 2008 (Act No. 71 of 2008) or a member of a close corporation registered in terms of the Close Corporation Act, 1984, (Act No. 69 of 1984).

Full name of principal	Identity number	Personal tax reference number

Attach separate page if necessary

Section 7: Record in the service of the state

Indicate by marking the relevant boxes with a cross, if any principal is currently or has been within the last 12 months in the service of any of the following:

a) a member of any municipal council
b) a member of any provincial legislature
c) a member of the National Assembly or the National Council of Province
1. a member of the board of directors of any municipal entity
2. an official of any municipality or municipal entity

□ an employee of any department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act of 1999 (Act No. 1 of 1999)

□ a member of an accounting authority of any national or provincial public entity

□ an employee of Parliament or a provincial legislature

If any of the above boxes are marked, disclose the following:

Name of principal	**Name of institution, public office, board or organ of state and position held**	**Status of service** *(tick appropriate column)*	
		Current	**Within last 12 months**

*insert separate page if necessary

Section 8: Record of family member in the service of the state

family member: a person's spouse, whether in a marriage or in a customary union according to indigenous law, domestic partner in a civil union, or child, parent, brother, sister, whether such a relationship results from birth, marriage or adoption

Indicate by marking the relevant boxes with a cross, if any family member of a principal as defined in section 5 is currently or has been within the last 12 months been in the service of any of the following:

d) a member of any municipal council
e) a member of any provincial legislature
f) a member of the National Assembly or the National Council of Province
3. a member of the board of directors of any municipal entity
4. an official of any municipality or municipal entity

□ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)

□ a member of an accounting authority of any national or provincial public entity

□ an employee of Parliament or a provincial legislature

If any of the above boxes are marked, disclose the following:

Name of family member	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months

***insert separate page if necessary**

Section 9: Record of termination of previous contracts with an organ of state

Was any contract between the tendering entity including any of its joint venture partners terminated during the past 5 years for reasons other than the employer no longer requiring such works or the employer failing to make payment in terms of the contract.

☐ Yes ☐ No (Tick appropriate box)

If yes, provide particulars (interest separate page if necessary)

Section 10: Declaration

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the tendering entity confirms that the contents of this Declaration are within my personal knowledge, and save where stated otherwise in an attachment hereto, are to the best of my belief both true and correct, and:

i) neither the name of the tendering entity or any of its principals appears on:

a) the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004 (Act No. 12 of 2004)

b) National Treasury's Database of Restricted Suppliers (see www.treasury.gov.za)

ii) neither the tendering entity of any of its principals has within the last five years been convicted of fraud or corruption by a court of law (including a court outside of the Republic of South Africa);

iii) any principal who is presently employed by the state has the necessary permission to undertake remunerative work outside such employment (attach permission to this declaration);

iv) the tendering entity is not associated, linked or involved with any other tendering entities submitting tender offers

v) has not engaged in any prohibited restrictive horizontal practices including consultation, communication, agreement, or arrangement with any competing or potential tendering entity regarding prices, geographical areas in which goods and services will be rendered, approaches to determining prices or pricing parameters, intentions to submit a tender or not, the content of the submission (specification, timing, conditions of contract etc) or intention to not win a tender;

vi) has no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest;

vii) neither the tenderer or any of its principals owes municipal rates and taxes or municipal service charges to any municipality or a municipal entity and are not in arrears for more than 3 months;

viii) SARS may, on an on-going basis during the term of the contract, disclose the tenderer's tax compliance status to the Employer and when called upon to do so, obtain the written consent of any subcontractors who are subcontracted to execute a portion of the contract that is entered into in excess of the threshold prescribed by the National Treasury, for SARS to do likewise.

Signed		Date	
Name		Position	

NOTE 1 The Standard Conditions of Tender contained in SANS 10845-3 prohibits anticompetitive practices (clause 3.1) and requires that tenderers avoid conflicts of interest, only submit a tender offer if the tenderer or any of his principals is not under any restriction to do business with employer (4.1.1) and submit only one tender either as a single tendering entity or as a member in a joint venture (clause 4.13.1). Clause 5.7 also empowers the Employer to disqualify any tenderer who engages in fraudulent and corrupt practice. Clause 3.1 also requires tenderers to comply with all legal obligations.

NOTE 2: Section 30(1) of the Public Service Act, 1994, prohibits an employee (person who is employed in posts on the establishment of departments) from performing or engaging remunerative work outside his or her employment in the relevant department, except with the written permission of the executive authority of the department. When in operation, Section 8(2) of the Public Administration Management Act, 2014, will prohibit an employee of the public administration (i.e. organs of state and all national departments, national government components listed in Part A of Schedule 3 to the Public Service Act, provincial departments including the office of the premier listed in Schedule 1 of the Public Service Act and provincial departments listed in schedule 2 of the Public Service Act, and provincial government components listed in Part B of schedule 3 of the Public Service Act) or persons contracted to executive authorities in accordance with the provisions of section 12A of the Public Service Act of 1994 or persons performing similar functions in organs of state from conducting business with the State or to be a director of a public or private company conducting business with the State. The offence for doing so is a fine or imprisonment for a period not exceeding 5 years or both. It is also a serious misconduct which may result in the termination of employment by the employer.

NOTE 3: Regulation 44 of Supply Chain Management regulations issued in terms of the Municipal Finance Management Act of 2003 requires that organs of state and municipal entities not award a contract to a person who is the service of the state, a director, manager or principal shareholder in the service of the state or who has been in the service of the state in the previous twelve months.

NOTE: 4: Regulation 45 of Supply Chain Management regulations requires a municipality or municipal entity to disclose in the notes to the annual statements particulars of any award made to a close family member in the service of the state.

NOTE: 5 Corrupt activities which give rise to an offence in terms of the Prevention and Combating of Corrupt Activities Act of 2004) include improperly influencing in any way the procurement of any contract, the fixing of the price, consideration or other moneys stipulated or otherwise provided for in any contract and the manipulating by any means of the award of a tender.

NOTE: 6 Section 4 of the Competition Act of 1998 prohibits restrictive horizontal practice including agreements between parties in a horizontal relationship which have the effect of substantially preventing or lessening competition, directly or indirectly fixing prices or dividing markets or constitute collusive tendering. Section 5 also prohibits restrictive vertical practices. Any restrictive practices that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties.

ATTACH THE FOLLOWING DOCUMENTS TO THIS PAGE

- **For Closed Corporations**

  CK1 or CK2 as applicable (Founding Statement)
  Certified Copies of the ID's of the Directors
  Certified Shareholders Certificate

OR

- **For Companies**

  A copy of the Certificate of Incorporation
  Certified Copies of the ID's of the Directors, and
  Certified shareholders register

OR

- **For Joint Venture Agreements**
- Joint Venture Agreement between all the parties,
- as well as the documents in (1) or (2) of each Joint Venture member.

OR

- **For Partnership**

  1. Certified Copies of the ID's of the partners

OR

- **One person Business / Sole trader**

  2. Certified Copy of ID

FORM F: MUNICIPAL DECLARATION AND RETURNABLE DOCUMENTS

(SIPDM)

The following particulars must be furnished in relation to tenders for municipalities and municipal entities where:

a) contractors are required; and

b) goods, services or a combination thereof where the estimated total of the prices exceeds R 10 million including VAT.

In the case of a joint venture, separate municipal declarations and returnable documents shall be submitted in respect of each partner.

Section 1: Enterprise Details

Name of enterprise:	
Contact person:	
Email:	
Telephone:	
Cell no	
Fax:	
Physical address	
Postal address	

Section 2: Declaration for Contractor's services:

The enterprise has been awarded the following contract services by an organ of state during the last five years.

Name of organ of state	Estimated number of contracts	Nature of service, e,g, quantity surveying	Service similar to required service (yes / no)?

Attach separate page as necessary

Section 3: Goods, services or a combination thereof where the estimated total of the prices exceeds R 10 million including VAT

I / we certify that

1 *(tick one of the boxes):*

□ the enterprise **is not** required by law to prepare annual financial statements for auditing

□ the enterprise **is** required by law to have audited annual financial statements and attached the audited financial statements for the past three financial years, or since the establishment as the enterprise was established within the past three years

2) the enterprise and its directors has / have no undisputed commitments for municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days *(i.e.: all municipal accounts are paid up to date)* Attach Municipal Utility Account;

3) source of goods and / or services:

(tick one of the boxes and insert percentages if applicable):

□ goods and / or services are sourced only from within the Republic of South Africa

□ [ ] % of the total cost of goods and / or services will be sourced from outside the Republic of South Africa and the percentage of payment from the municipality or municipal entity which is expected to be transferred out of the Republic is [ ] %

I furthermore confirm that the following contracts were awarded to the enterprise by an organ of state during the last five years and attached particulars of any material non-compliance or dispute concerning the execution of such contracts:

Name of organ of state	**Estimated number of contracts**	**Nature of contracts**

Attach separate page as necessary

I, the undersigned who warrants that I am duly authorised on behalf of the tendering entity, hereby declare that the contents of this Declaration are within my personal knowledge, and save where stated otherwise are to the best of my belief both true and correct

Signed		Date	
Name		Position	

ATTACHED HERETO AN ORIGINAL OR CERTIFIED COPY OF THE MUNICIPAL UTILITY ACCOUNT NOT OLDER THAN 3 MONTHS

FORM G: CERTIFICATE OF INDEPENDENT TENDER (MBD 9)

Notes to tenderer:

a) This certificate conforms to Treasury Regulation 16A9 and the requirement of section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, that prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive tendering.
b) Collusive tendering is a conspiracy between businesses that would normally be expected to compete, to agree not to compete, in a tender process.
c) This certificate serves as a declaration by the tenderer that the tender submitted is free from any collusion with a competitor.

CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

I, the undersigned, in submitting the accompanying tender:

_____

(Tender Number and Description)

in response to the invitation for the tender made by:

_____

(Name of Municipality / Municipal Entity)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of:_____that:

(Name of Tenderer)

i) I have read and I understand the contents of this Certificate;

ii) I understand that the accompanying tender will be disqualified if this Certificate is found not to be true and complete in every respect;

iii) I am authorized by the tenderer to sign this Certificate, and to submit the accompanying tender, on behalf of the tenderer;

iv) Each person whose signature appears on the accompanying tender has been authorized by the tenderer to determine the terms of, and to sign, the tender, on behalf of the tenderer;

v) For the purposes of this Certificate and the accompanying tender, I understand that the word "competitor" shall include any individual or organization, other than the tenderer, whether or not affiliated with the tenderer, who:
   (a) has been requested to submit a tender in response to this tender invitation;
   (b) could potentially submit a tender in response to this tender invitation, based on their qualifications, abilities or experience; and
   (c) provides the same goods and services as the tenderer and/or is in the same line of business as the tenderer

vi) The tenderer has arrived at the accompanying tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However,

communication between partners in a joint venture or consortium[3] will not be construed as collusive bidding.

vii) In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

a) prices;
b) geographical area where product or service will be rendered (market allocation)
c) methods, factors or formulas used to calculate prices;
d) the intention or decision to submit or not to submit, a tender;
e) the submission of a tender which does not meet the specifications and conditions of the tender; or
f) bidding with the intention not to win the tender.

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

ix) The terms of the accompanying tender have not been, and will not be, disclosed by the tenderer, directly or indirectly, to any competitor, prior to the date and time of the official tender opening or of the awarding of the contract.

x) I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to tenders and contracts, tenders 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.

Signature	Date
Capacity under which Tender is Signed	Name of Tenderer

FORM H: DECLARATION OF GOOD STANDING REGARDING TAX (MBD 2)

ATTACH VALID TAX COMPLIANCE STATUS (TCS) TO THIS PAGE

Tax Compliance Status (TCS) must be submitted together with the tender. Failure to submit the above-mentioned documentation will result in the invalidation of the tender.

In tenders where Consortia / Joint Ventures / Sub-contractors are involved, each party must submit a separate Tax Compliance Status (TCS).

FORM I: DECLARATION OF TENDERER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES (MBD 8)

Notes to tenderer:

1. This tender document must form part of all tenders invited.
2. This form serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.
3. The tender of any tenderer may be disregarded if that tenderer or any of its directors have
   a. abused the institution's supply chain management system;
   b. committed fraud or any other improper conduct in relation to such system;
   c. failed to perform on any previous contract.
4. In order to give effect to the above, the following questionnaire must be completed and submitted with this tender.

Item	Question	Yes	No
4.1	**Is the tenderer or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector?** **(Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the *audi alteram partem* rule was applied).** **The Database of Restricted Suppliers now resides on the National Treasury's website(www.treasury.gov.za) and can be accessed by clicking on its link at the bottom of the home page.**	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the tenderer or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the tenderer or any of its directors convicted by a court of law (including a court of law outside the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		

4.4	4. Does the tenderer or any of its directors owe any municipal rates and taxes or municipal charges to the municipality / municipal entity, or to any other municipality / municipal entity, that is in arrears for more than three months?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		
4.5	Was any contract between the tenderer and the municipality / municipal entity or any other organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.7.1	If so, furnish particulars:		

5. CERTIFICATION

6.

7.

8. I, THE UNDERSIGNED (FULL NAME) ……

9.

10. CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

11.

12. I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

13.

14.

15.

Signature

Date

Capacity under which Tender is Signed

Name of Tenderer

FORM J: REGISTRATION ON NATIONAL TREASURY CENTRAL SUPPLIER DATABASE

The tenderer shall provide a printed copy of the Active Supplier Listing on the National Treasury Central Supplier Database. (www.treasury.gov.za). Tenderers who are not registered on the Central Supplier Database should attach proof of their application for registration (refer to Tender Data Clause 4.1). In the case of a Joint Venture, a printed copy of the Active Supplier Listing must be provided for each member of the Joint Venture.

Name of Contractor: .....

Central Supplier Database Supplier Number: .....

Affix Proof of the National Treasury Central Supplier Database to this page
(Full CSD required, not summary)

FORM K: DECLARATION OF TENDERER'S LITIGATION HISTORY

Does the tenderer have any litigation with which tenderer (including its directors, shareholders, or other senior members in previous companies) have been involved with any organ of state or state department within the last ten years?

If yes, furnish your details in table below.

YES	NO

NB: It is compulsory for all bidders to sign this form

The tenderer shall list below details of any litigation with which the tenderer (including its directors, shareholders or other senior members in previous companies) has been involved with any organ of state or state department within the last ten years. The details must include the year, the litigating parties, the subject matter of the dispute, the value of any award or estimated award if the litigation is current and in whose favour the award, if any, was made.

Client	Other Litigating Party	Dispute	Award Value	Date Resolved

Signature

Date

Capacity under which Tender is Signed

Name of Tenderer

FORM L: AUTHORITY OF SIGNATORY

Details of person responsible for tender process:

Name: ----------

Contact number: ----------

Office address: _____

Signatories for close corporations and companies shall confirm their authority by attaching to this form a **duly signed and dated original or certified copy on the Company Letterhead** of the relevant resolution of their members or their board of directors, as the case may be.

PRO-FORMA FOR COMPANIES AND CLOSE CORPORATIONS:

"By resolution of the board of directors passed on *(date)*

Mr

has been duly authorized to sign all documents in connection with the Tender for Contract Number/Name

……and any Contract which may arise there from on

behalf of ……
(BLOCK CAPITALS)

SIGNED ON BEHALF OF THE COMPANY

IN HIS CAPACITY AS .....

DATE .....

FULL NAMES OF SIGNATORY .....

SIGNATURE .....

AS WITNESSES: 1. NAME …… SIGNATURE ……

2. NAME …… SIGNATURE ……

PRO-FORMA FOR JOINT VENTURES:

Certificate of Authority for Joint Ventures

We, the undersigned, are submitting this tender offer in Joint Venture and hereby authorise…… Mr/Ms ……..., authorised signatory of the company ……, acting in the capacity of lead partner, to sign all documents in connection with the tender offer an any contract resulting from it on our behalf.

NAME OF FIRM	ADDRESS	DULY AUTHORISED SIGNATORY
		Signature: …….. Name: ……. Designation: ……..
		Signature: …….. Name: ……. Designation: ……..
		Signature: …….. Name: ……. Designation: ……..
		Signature: …….. Name: ……. Designation: ……..

ATTACHED HERETO THE DULY SIGNED AND DATED ORIGINAL OR CERTIFIED COPY OF AUTHORITY OF SIGNATORY ON COMPANY LETTERHEAD

FORM M: SCHEDULE OF SPECIALIST SUBCONTRACTORS

Notes to tenderer:

1. The tenderer shall list below the specialist items of work on this contract. Alternatives may be mentioned.
2. The tenderer shall state whether he intends to carry out any specialised work himself.

Acceptance of this tender shall not be construed as approval of all or any of the listed specialist subcontractors. Should any or all of the specialist subcontractors not be approved subsequent to the acceptance of the tender, it shall in no way invalidate this tender, and the tendered unit rates for the various items of work shall remain final and binding, even in the event of a subcontractor not listed below being approved by the engineer.

SPECIALISED ITEM	INDICATE IF SUB-CONTRACTED (Tick correct option)	
	YES	NO

In order to complete the Works under this Contract, I/we propose to employ the following sub-contractors to carry out the portion/type of work as detailed. **Affix Original or Certified proof of 3 previous projects for each sub-contractor.**

(Note: All proposed sub-contractors must be listed).

Sub-contractor: Name, Address and Telephone No.	Portion/type of work to be undertaken	
_____ _____ **(____)**_____		**Previous value of work:** **Previous Experience:**
_____ _____ **(____)**_____		**Previous value of work:** **Previous Experience:**

_____ _____ **(____)_____**		**Previous value of work:** **Previous Experience:**
_____ _____ **(____)_____**		**Previous value of work:** **Previous Experience:**

FORM N: PROOF OF GOOD STANDING WITH COMPENSATION COMMISSIONER

Notes to tenderer:

1. Discovery that the tenderer has failed to make proper disclosure may result in Ehlanzeni District Municipality terminating a contract that flows from this tender on the ground that it has been rendered invalid by the tenderer's misrepresentation.

2. The tenderer shall attach to this Form evidence that he is registered and in good standing with the compensation fund or with a licensed compensation insurer who is approved by Department of Labour in terms of section 80 of the Compensation for Injury and Disease Act 1993 (COID) (Act 130 of 1993).

Affix certified Proof of Good Standing with Compensation Commissioner to this page

FORM O: SCHEDULE OF CURRENT COMMITMENTS

Notes to tenderer:

(a) The tenderer shall list below all contracts currently under construction or awarded and about to commence and tenders for which offers have been submitted but awards not yet made.
(b) In the event of a joint venture enterprise, details of all the members of the joint venture shall similarly be attached to this form.
(c) The lists must be restricted to not more than 5 contracts and 5 tenders. If a tenderer's actual commitments or potential commitments are greater than 5 each, those listed should be in descending order of expected final contract value or sum tendered.

Contracts Awarded				
Employer	**Project**	**Expected Value of contract (Inclusive of VAT)**	**Durations (Months)**	**Expected Completion Date**

Tenders not Yet Awarded				
Employer	**Project**	**Tendered Amount (Inclusive of VAT)**	**Tendered Durations (Months)**	**Expected Commencement Date**

Signature

Date

Capacity under which Tender is Signed

Name of Tenderer

FORM P: REGISTRATION WITH CIDB

The tenderer shall provide a printed copy of the Active Contractor's Listing off the CIDB website. (www.cidb.org.za). Tenderers whose CIDB registration expires within 21 days after close of tender should attach proof of their application for re-registration (refer to Tender Data Clause 4.1). In the case of a Joint Venture, a printed copy of the Active Contractor's Listing must be provided for each member of the Joint Venture.

Name of Contractor: .....

Contractor Grading Designation: .....

CIDB Contractor Registration Number: .....

Expiry Date: .....

RETURNABLES FOR QUALITY CRITERIA

FORM Q: COMPANY EXPERIENCE IN RELATION TO SCOPE OF WORKS

The Tenderer will receive a maximum of 50 points based on information provided in this schedule.

The following is a statement of work of similar nature and size recently successfully executed by myself / ourselves:

1. Points will be given for projects completed of similar nature and size.
2. The tenderer scores 5 points per project with a value of less or equal to R2 million completed in the last 5 years.
3. The tenderer scores 7 points per project with a value of between R2 and R5 million completed in the last 5 years.
4. The tenderer scores 10 points per project with a value of more than R5 million completed in the last 5 years.
5. The tenderer may attach not more than 5 projects of similar nature and size (concrete bridges or any other mass concrete works that include reinforcement).
6. The maximum Quality points for each criterion are listed below.
7. Positive feedback from the Consulting Engineer from the designated / listed contact person will contribute toward points allocated for the attached certificates of completion.
8. Positive feedback from the Employer from the designated / listed contact person will contribute toward points allocated for the attached certificates of completion.
9. Points for completion certificates attached will be given for similar projects. Negative feedback will forfeit all points, meaning zero (0) points will be allocated for the attached certificates of completion.
10. Failure to submit all relevant information per project will result in the forfeiture of all points for that relevant project.
11. The experience of the Tenderer or joint venture partners in a consortium will be evaluated based on experience in similar projects or similar areas and conditions in relation to the scope of work required for this project.

Certified Appointment letter as well as Completion Certificate (signed by client and engineer) of Relevant Work (to be attached – zero points if both is not attached)	**Consulting Engineer: Contact Person and Telephone Number**	**Employer: Contact Person and Telephone Number**	**Value of Work** (inclusive of VAT)	**Date Completed**	**Points Awarded by the Engineer**
*Attach additional pages if more space is required		Total Points			

FORM R: PLANT & EQUIPMENT

The tenderer will receive a maximum of 15 points based on information provided in this schedule.

1. The following are lists of major items of relevant equipment that I / we presently own or lease and will have available for this contract or will acquire or hire for this contract if my / our tender is accepted.

2. The tenderer will receive Quality points for listing of plant available for this specific contract as follows:

   - Major plant for construction works if well identified and 100% is owned and available at start of contract maximum points will be as stated in allocated points if owned column.
   - No points will be allocated for hired plant as indicated in the Allocate points for hired plant column on the table below.
   - Points for the plant correctly identified and owned will be calculated according to the allocated points based on the quantities under the Quantities Required column.

3. Proof of ownership to be submitted: Natis to be attached.

4. Documents requested above must be certified and not older than 3 months. Failure to adhere to the directive zero points will be allocated

Description, size, capacity, etc.	Number Required	Allocated Points if owned	Allocated Points if hired	Points Scored
Excavator (20 ton) or	1	10	5	
TLB (48 kW Capacity)	1	4	2	
Tamping Rammer (4,8 kW)	1	1	1	
Total		**15**	**8**	
Total Points Allocated				

* Attached additional pages if more space is required.

FORM S: FINANCIAL RESOURCES
BANKING INFORMATION

FINANCIAL CAPACITY 10 POINTS

Bank rating: A = 10 POINTS
B = 6 POINTS
C = 4 POINTS

NB: the bank rating must be based on the amount reflected on the form of offer. No points will be allocated on the rating below the tendered amount. The City reserves the right to verify the information with the Financial Service Provider. In case of a JV, Consortium or partnership only the details of the lead partner will be considered.

DETAILS OF TENDERERS BANKING INFORMATION

Notes to tenderer:

- The tenderer shall attach to this form a letter of intent for 10% bank guarantee.
- In the event that the tenderer is a joint venture enterprise, the bank guarantee will be expected from the Lead Partner.

BANK NAME:	
ACCOUNT NAME: *(e.g. ABC Civil Construction cc)*	
ACCOUNT TYPE: *(e.g. Savings, Cheque etc.)*	
ACCOUNT NO:	
ADDRESS OF BANK:	
CONTACT PERSON:	
TEL. NO. OF BANK / CONTACT:	
How long has this account been in existence:	0-6 months ☐ 7-12 months ☐ 13-24 months ☐ More than 24 months ☐ (Tick which is appropriate)

ATTACH HERETO AN ORIGINAL LETTER FROM THE BANK TO THIS PAGE NOT OLDER THAN THREE (3) MONTHS

FORM S: FINANCIAL RESOURCES
DECLARATION OF PROCUREMENT ABOVE R 10 MILLION (GBD5)

For all procurement expected to exceed R10 million (all applicable taxes included), tenderer must complete the following questionnaire:

- Are you by law required to prepare annual financial statements for auditing?

  YES / NO

1.1 If yes, submit audited financial statements for the past three years or since the date of establishment if established during the past three years.

……..

……..

2. Do you have any outstanding undisputed commitments for municipal services towards any municipal for more than three months or any other service provider in respect of which payments is overdue for more than 30 days?

YES / NO

……

……

2.1 If no, this serves to certify that the tenderer has no undisputed commitments for municipal services towards any municipality for more than three months or other service provider in respect of which payment is overdue for then 30 days?

…..……..……

……..

2.2 If yes, please provide particulars

…..……

…….

3.1 Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract?

YES / NO

.....

……

a. If yes, furnish particulars

……

……

4. Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion of payment from the municipality / /municipal entity is expected to be transferred out of the Republic?

YES / NO

4.1 If yes, furnish particulars

……

……

CERTIFICATION

I, THE UNDERSIGNED (NAME) ……...

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT.

I ACCEPT THAT THE STE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE

Signature	Date
Capacity under which Tender is Signed	Name of Tenderer

FORM S: FINANCIAL RESOURCES
DOCUMENTATION OF INTENT TO PROVIDE A PERFORMANCE GUARANTEE

*The Tenderer must attach hereto an **Original Letter** from the bank or institution with whom he has made the necessary arrangements, to the effect that the said bank or institution will be prepared to provide the required performance guarantee when asked to do so. (Letter of Intent)*

A Pro forma follows herewith for the tenderer to use.

PRO-FORMA FOR A PERFORMANCE GUARANTEE
PERFORMANCE GUARANTEE

Employer
(Name and Address) _____

_____

Contract No _____

Contract Title _____

WHEREAS _____
(hereinafter referred to as "the Employer") entered into, a Contract with:

_____
(hereinafter called "the Contractor") on the _____ day of _____ 20 _____

for the construction of (Contract Title)

_____

at _____

AND WHEREAS it is provided by such Contract that the Contractor shall provide the Employer with security by way of a guarantee for the due and faithful fulfilment of such Contract by the Contractor;

AND WHEREAS WE _____ (hereinafter referred to as "the Guarantor") has/have at the request of the Contractor, agreed to give such guarantee;

NOW THEREFORE WE do hereby guarantee and bind ourselves jointly and severally as Guarantor and Co-Principal Debtor to the Employer under renunciation of the benefits of division and exclusion for the due and faithful performance by the Contractor of all the terms and conditions of the said Contract, subject to the following conditions:

1) The Employer shall, without reference and/or notice to us, have complete liberty of action to act in any manner authorised and/or contemplated by the terms of the said Contract, and/or to agree to any modifications, variations, alterations, directions or extension of the Completion Data of the Works under the said Contract, and that its rights under this guarantee shall in no way be prejudiced nor or liability hereunder be affected by reason of any steps which the Employer may take under such Contract, or of any modification, variation, alterations of the Completion Date which the Employer may make, give, concede or agree to under the said Contract.

2) This guarantee shall be limited to payment of a sum of money.

3) The Employer shall be entitled, without reference to us, to release any guarantee held by it, and to give time to or compound or make any other arrangement with the Contractor.

However, upon receipt by us of an authenticated copy of the Certificate of Completion in terms of the Contract, the amount of liability shall be reduced by 50% which shall be in force until the issue of the Final Approval Certificate at expiry of the Defects Liability Period

This guarantee shall remain in full force and effect until the issue of the Certificate of Completion in terms of the Contract, unless we are advised in writing by the Employer before the issue of the said Certificate of Completion

4) His intention to institute claims, and the particulars thereof, in which event this guarantee shall remain in full force and effect until all such claims have been paid of liquidated,

5) Our total liability hereunder shall not exceed the sum of

_____

_____ (in words)

R _____ (in figures)

(10% of the tender sum) that amount I/we agree to hold at your disposal.

6) The Guarantor reserves the right to withdraw from this guarantee by depositing the Guaranteed Sum with the beneficiary, whereupon the Guarantor's liability hereunder shall cease.

I/We declare that I/we, on behalf of the Guarantor, waive the legal exceptions available to a guarantor and undertake to pay the said amount or such portion thereof as may be demanded, immediately on receipt of a written demand from you.

A certificate under your hand shall be sufficient and satisfactory evidence as to the amount of the Guarantor's liability for the purpose of enabling provisional sentence or any similar relief to be obtained against the Guarantor.

This guarantee is neither negotiable or transferable, and must be surrendered to the Guarantor in the event of the full amount of the Guarantee being paid to the Employer.

7) I/We hereby choose our address for the serving of all notices for all purposes arising here from as

_____

_____

IN WITNESS WHEREOF this guarantee has been executed by us at

_____ on the _____ day of _____ 20 _____

As witness:

1. _____ Signature _____

2. _____ Signature _____

Duly authorised to sign on behalf of
(Guarantor) _____

Address _____

_____

_____

FORM T: KEY PERSONNEL, EXPERIENCE AND QUALIFICATIONS

The Tenderer will receive a maximum of 25 points based on information provided in this Schedule

Notes to tenderer:

1. The intention of this form is to demonstrate the tenderer's project structure, as well as the lines of responsibility between members of the project team and the overall company structure. Attach own organogram to this form.
2. Joint Venture tenders require each element of the venture to submit separate organograms that show the individual structure of each member company and the lines of responsibility of the proposed personnel involved in the project. In addition, there must also be a combined organogram that indicates how the joint venture itself will function and the proposed share of the work will become a contractual obligation between the members of the joint venture.
3. State the city or town where the company's head office is located. The locality of regional or satellite offices, regardless of degree of autonomy or size is not required. Only submit the number of offices other than the head office. Do not count offices outside RSA.
4. For all foreign nationals must attach SAQA accreditation and certified proof of work permit

CONSTRUCTION PERSONNEL

i) Contract manager

Contract manager is required to have a minimum of NQF Level 7 in Civil engineering or equivalent and a minimum of 10 years in water services construction, as indicated below:

EXPERIENCE IN WATER SERVICES CONSTRUCTION	10	11	12	13	14
POINTS	1	2	3	4	5

ii) Site Agent

Site Agent is required to have a minimum of N.D Civil engineering or equivalent to a NQF 6 qualification and a minimum of 10 years in water services construction, as indicated below:

EXPERIENCE IN WATER SERVICES CONSTRUCTION	10	11	12	13	14
POINTS	2	4	6	8	10

iii) Site Foreman

Site Foreman on permanent/contract basis, with at least NQF 4 qualification or related qualification with experience in water services projects of not less than seven (7) years. Points will be allocated on a pro-rata basis for experience between 7 to 10 years, as indicated below:

EXPERIENCE IN WATER SERVICES CONSTRUCTION	**7**	**8**	**9**	**10**
POINTS	**2**	**3**	**4**	**5**

iv) Safety Officer

Safety officer on permanent/contract basis, with a valid certificate issued by SACPCMP and with experience in water services projects of not less than three (3) years. Points will be allocated on a pro-rata basis for experience between 3 to 5 years, as indicated below:

EXPERIENCE IN WATER SERVICES CONSTRUCTION	**3**	**4**	**5**
POINTS	**2**	**3**	**5**

Experience	**Points**
Provide detailed CVs and **certified** qualifications for all Key Personnel for each category stated above.	**25**

N.B Points to be allocated based on the CV's provided. The appointed contractor is to provide such personnel as attached or one with equivalent qualifications and experience. Failure to do so will result in zero points.

ATTACH CV'S AND CERTIFIED QUALIFICATIONS OF KEY PERSONNEL TO THIS PAGE

Note: Only CV's and Certified Qualifications of Key personnel that were named and shown on the organogram to be attached.

COMPETENCE ACHIEVEMENT SCHEDULE (QUALITY)

		MAXIMUM POINTS TO BE ALLOCATED	POINTS CLAIMED BY TENDERER	ALLOCATED POINTS
Company Experience:	Form Q	50		
Plant and Equipment:	Form R	15		
Financial References:	Form S	10		
Key Personnel:	Form T	25		
	Sub- Total	100		
	TOTAL	**100**		

Note:

Total allocated for Quality is 100 points. The minimum threshold required to qualify for the next stage of evaluation is 70 points. Only those tenders that achieve the minimum number will proceed to the price and preference evaluation stage**.**

SUPPLY CHAIN POLICY USING 80/20 PREFERENCE POINT SYSTEM

DESCRIPTION	MAXIMUM POINTS TO BE ALLOCATED
Price	**80**
B-BBEE Status Level of Contribution	**20**
TOTAL	**100**

FORM V: SCHEDULE OF TENDER COMPLIANCE

Note to tenderer:

This Table has been created as an aid to ensure a tenderer's compliance with the completion of the returnable forms and schedules and subsequent placement in the correct envelope.

FORM NO / GBD NO	FORM DESCRIPTION	TICK IF COMPLETED
A	CERTIFICATE OF ATTENDANCE AT CLARIFICATION MEETING	
B	RECORD OF ADDENDA TO TENDER DOCUMENTS	
C	PROPOSED AMENDMENTS AND QUALIFICATIONS	
D	PREFERENCING SCHEDULE: BROAD BASED BLACK ECONOMIC EMPOWERMENT STATUS	
E	COMPULSORY DECLARATION	
F	MUNICIPAL DECLARATION AND RETURNABLE DOCUMENTS	
G	CERTIFICATE OF INDEPENDENT TENDER	
H	DECLARATION OF GOOD STANDING REGARDING TAX	
I	DECLARATION OF TENDERER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES	
J	REGISTRATION ON NATIONAL TREASURY CENTRAL SUPPLIER DATABASE	
K	DECLARATION OF TENDERER'S LITIGATION HISTORY	
L	AUTHORITY OF SIGNATORY	
M	SCHEDULE OF SPECIALIST SUBCONTRACTORS	
N	PROOF OF GOOD STANDING WITH COMPENSATION COMMISSIONER	
O	SCHEDULE OF CURRENT COMMITMENTS	
P	REGISTRATION WITH CIDB	
Q	COMPANY EXPERIENCE IN RELATION TO SCOPE OF WORKS	
R	PLANT & EQUIPMENT	
S	FINANCIAL RESOURCES	
T	KEY PERSONNEL, EXPERIENCE AND QUALIFICATIONS	
V	SCHEDULE OF TENDER COMPLIANCE	

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

THE CONTRACT

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

PART C1 AGREEMENT AND CONTRACT DATA

PART C2 PRICING DATA

PART C3 SCOPE OF WORKS

PART C4 SITE INFORMATION

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

PART C1 AGREEMENT AND CONTRACT DATA

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

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CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

C1.1 FORM OF OFFER

C1.2 FORM OF ACCEPTANCE

C1.3 SCHEDULE OF DEVIATIONS

C 1.1: FORM of OFFER

OFFER

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

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

The tenderer, identified in the offer signature block, has examined the documents listed in the tender data and addenda thereto as listed in the tender returnables 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 offered total of the prices, inclusive of any value added tax or sales tax which the law requires the employer to pay, is

1.
2. _____ (in words)
3.

R _____ (in figures)

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 terms of the conditions of the contract identified in the contract data.

for the TENDERER

Signature: _____

Name: _____

Capacity: _____

Name and address: _____

_____

_____

Name and _____ Date: _____

Signature of Witness _____

C1.2: FORM of ACCEPTANCE

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 C 1: Agreements and contract data, (which includes this agreement)
Part C 2: Pricing data
Part C 3: Scope of work.
Part C 4: Site information

and drawings and documents or parts thereof, which may be incorporated by reference into Parts C1 to C4 above.

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 at, or just after, the date this agreement comes into effect. 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 working days of the date of such receipt, notifies the employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

for the EMPLOYER

Signature: _____

Name: _____

Capacity: _____

Name and address: _____

_____

_____

Name and _____ Date: _____

Signature of witness _____ _____

C1.3: SCHEDULE of DEVIATIONS

1 Subject
Details
2 Subject
Details
3 Subject
Details
4 Subject
Details

By the duly authorized 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 returnable 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.

for the TENDERER

Signature: _____

Name: _____

Capacity: _____

for the EMPLOYER

(Name and address): _____

_____

_____

Name and _____ Date: _____

Signature of witness _____

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

C1.4 CONTRACT DATA

C1.4: CONTRACT DATA

GENERAL CONDITIONS OF CONTRACT

PART 1: DATA PROVIDED BY THE EMPLOYER

CONDITIONS OF CONTRACT

The General Conditions of Contract for Construction Works, Third Edition, 2015, published by the South African Institution of Civil Engineering, Private Bag X200, Halfway House, 1685, are applicable to this contract and is obtainable form www.saice.org.za.

CONTRACT SPECIFIC DATA

The following contract specific data, referring to the General Conditions of Contract for Construction Works, Third Edition, 2015, are applicable to this Contract.

PART 1: DATA PROVIDED BY THE EMPLOYER

The following contract specific data are applicable to this Contract:

Clause	Description
1.1.1.13	The Defects Liability Period is **12 months**
1.1.1.15	The Name of the Employer is the **City of Mbombela**.
1.1.1.16	The Name of the Employer's Agent is **Mr L Fourie (Pr.Eng)**, also referred to in the Contract as "TFC Engineers (Pty) Ltd".
1.1.1.26	The pricing strategy: **Re-Measurement Contract**
1.2.1.2	The Employer's address for receipt of communications is: Physical address: **1 Nel Street MBOMBELA 1200** Postal address: **PO Box 45 MBOMBELA 1200** Telephone: **013 759 2181** E-mail: **sandile.ncongwane@mbombela.gov.za**
1.2.1.2	The address of the Employer's Agent is: Physical address: **46 Murray Street Mbombela 1200** Postal address: **PostNet Suite #370 Private Bag X11326 Mbombela 1200** Telephone: **013 752 7475** E-mail: **info@tfce.co.za**
2.4	**Variations to the Conditions of Contract are:** Add the following at the end of sub clause 2.4.1: " The several documents forming the Contract shall rank in the following order of precedence: 1. Contract Agreement,

Clause	Description
	2. Form of Offer and Acceptance, 3. Contract Data, 4. Specification Data, 5. Standardized Specifications, 6. Drawings, 7. Bill of Quantities, 8. Statutory Regulations, 9. Other standard specifications. If the contents of any part of the documents contradict any other part, the document in the highest position on the above order of precedence shall have preference and apply."
4.3.3	Add the following at the end of sub clause 4.3.2: "4.3.3 The Employer and the Contractor hereby agree, in terms of the provisions of Section 37(2) of the Occupational Health and Safety Amendment Act, 1993 (Act 85 of 1993), hereinafter referred to as 'the Act', that the following arrangements and procedures shall apply between them to ensure compliance by the Contractor with the provisions of the Act: 4. (i) The Contractor undertakes to acquaint the appropriate officials and employees of the Contractor with all relevant provisions of the Act and the Regulations promulgated in terms of the Act. 5. (ii) The Contractor undertakes that all relevant duties, obligations and prohibitions imposed in terms of the Act and Regulations on the Contractor will be fully complied with. 6. (iii) The Contractor accepts sole liability for such due compliance with the relevant duties, obligations and prohibitions imposed by the Act and Regulations and expressly absolves the Employer from himself being obliged to comply with any of the aforesaid duties, obligations and prohibitions, with the exception of such duties, obligations and prohibitions expressly assigned to the Employer in terms of the Act and its associated Regulations. 7. (iv) The Contractor agrees that any duly authorized officials of the Employer shall be entitled, although not obliged, to take such steps as may be necessary to monitor that the Contractor has conformed to his undertakings as described in paragraphs (i) and (ii) above, which steps may include, but will not be limited to, the right to inspect any appropriate site or premises occupied by the Contractor, or any appropriate records or safety plans held by the Contractor. 8. (v) The Contractor shall be obliged to report forthwith to the Employer and Employer's Agent any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the Act and Regulations, pursuant to work performed in terms of this Contract, and shall, on written demand, provide full details in writing, to the Employer and Employer's Agent, of such investigation, complaint or criminal charge.

Clause	Description
	9. The Contractor shall furthermore, in compliance with Constructional Regulations 2003 to the Act: 10. (vi) Acquaint himself with the requirements of the Employer's health and safety specification as laid down in regulation 5(1) of the Construction Regulation 2014, and prepare a suitably and sufficiently documented health and safety plan as contemplated in regulation 6(1) of the Construction Regulation 2014 for approval by the Employer or his assigned agent. The Contractor's health and safety plan and risk assessment shall be submitted to the Employer for approval within seven (7) days after acceptance of the bid. and shall be implemented and maintained from the Commencement of the Works. (vii) The Employer, or his assigned agent, reserves the right to conduct periodic audits, as contemplated in the Construction Regulations 2003, to ensure that the Contractor is compliant in respect of his obligations. Failure by the Contractor to comply with the requirements of these Regulations shall entitle the Employer's Agent, at the request of the Employer or his agent, to suspend all or any part of the Works, with no recourse whatsoever by the Contractor for any damages incurred as a result of such suspension, until such time that the Employer or his agents are satisfied that the issues in which the Contractor has been in default have been rectified." 11. The Employer and Contractor agree that the Contractor will comply with the provisions of "The Mine Health and Safety Act, (Act 29 0f 1996) as amended by the Mine Health and Safety Amendment Act (Act 72 of 1997). The following arrangements and procedures will apply: (i) The Contractor shall himself obtain the Mining Authorisation for the sites. (ii) Contractor shall assume responsibility for the Environmental Management Programmes (EMP) in respect of the sites and shall ensure that the sites are rehabilitated at the conclusion of the Contract. (iii) The Contractor shall comply with the provisions of the Act and the requirements of the Director: Mineral Development of the Department of Minerals and Energy in making the necessary financial provisions to mine optimally and safety and to rehabilitate the surface of the land concerned satisfactory and to carry out the EMP. All costs incurred in providing a guarantee or other financial provision shall be borne by the Contract. (iv) This Agreement shall hold good from the date on which the Mining Authorisation is issued until the date on which a Closure Certificate is issued in terms of the Minerals Act, 1991. (v) Nothing in this Agreement shall exonerate the Contractor from compliance with any requirements of the Employer's Agent regarding the rehabilitation of sites prior to the issue of a Final Approval Certificate in terms of clause 5.16.2 of the General Conditions of Contract (2010). (vi) The Contractor shall undertake all the duties and accept all the responsibilities of the owner in compliance with the requirements of the Act as amended.

Clause	Description
	(vii) The Contractor accepts responsibility for compliance with the Act, as amended, by all his sub-contractors whether or not selected and/or approved by the Employer.
5.3.1	The documentation required before commencement with Works execution are: • Health and Safety Plan (refer to clause 4.3.1) • Initial programme (Refer to clause 5.6.1) • Security (Refer to clause 6.2.1) • Insurance (Refer to Clause 8.6.1)
5.3.2	The time to submit the documentation required, before commencement with Works execution is **14 calendar days.**
5.4.2	The access and possession of site shall **not** be exclusive to the Contractor.
5.8.1	The non-working days are public holidays and Sundays. The special non-working days are: The year-end break from **18-Dec-2023 to 05-Jan-2024, 17 December 2024 to 03 January 2025, 15 December 2025 to 02 January 2026 OR AS PER SAFCEC To Be Announced**
5.13.1	The penalty for failing to complete the Works is: is **0.05 %** of the Total Tender Sum per Calendar Day
5.14.1	Practical completion is reached when: The complete scope of works is tested and commissioned.
5.16.3	The latent defect period is **10 years** after date of completion
6.5.1.2.3	The percentage allowances to cover all charges for the Contractor's and subcontractor's profits, timekeeping, clerical work, insurance, establishment, superintendence and the use of hand tools is **15%**.
6.8.2	This contract does **not** include for contract price adjustment
6.8.3	Price adjustments for variations in the costs of special materials are **not** allowed.
6.10.1.5	The percentage advance on materials not yet built into the Permanent Works is **80%**
6.10.3	The limit of retention money is **10%**
8.6.1.1.2	Not required.
8.6.1.1.3	The amount to cover professional fees for repairing damage and loss to be included in the insurance sum will be calculated at **12%** of the claim value.
8.6.1.2	A coupon policy for Special Risks Insurance issued by the South African Special Risks Insurances Association is required.
8.6.1.3	The limit of liability insurance is **R 5 million**

Clause	Description
10.5.2	Dispute resolution shall be **ad-hoc** adjudication.
10.5.3	The number of Adjudication Board Members to be appointed is **one**.
10.7.1	The determination of disputes shall be by **arbitration.**
Special Clause	The Contractor's CIDB grading must remain active at the same of higher level as at time of appointment, should the grading be suspended, downgraded and or expire the Contractor will only be allowed 21 days to remedy such and failure could result in termination of the Contract.

PART 2: DATA PROVIDED BY THE CONTRACTOR

The Contractor is advised to read the *General Conditions of Contract for Construction Works, Third Edition (2015)* published by the South African Institution of Civil Engineering, to understand the implications of this Data which is required to be completed.

Each item of data given below is cross-referenced to the clause of Conditions of Contract to which it mainly applies.

<table>
<tr><th>Clause</th><th>Description</th></tr>
<tr><td>1.1.1.9

1.2.1.2</td><td>The Contractor is ……..
……..
The Contractor's address for receipt of communications is:
Physical address: Postal address:
…….. ……
…….. ……
…….. ……
…….. ……
Telephone : ……..
Fax: ……..
E-mail: ……..</td></tr>
<tr><td>1.1.1.14</td><td>The time for achieving Practical Completion of the whole of the Works
is …… weeks after Commencement Date (site handover).</td></tr>
<tr><td>6.2.1</td><td>The security to be provided by the Contractor shall be one of the following
<table>
<tr><th>Type of Security</th><th>Contractor to choose: Indicate “ Yes” or “ No”</th></tr>
<tr><td>Cash deposit of 10% of the contract sum</td><td></td></tr>
<tr><td>Performance guarantee of 10% of the contract sum</td><td></td></tr>
</table></td></tr>
</table>

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

C1.5 FORM OF GUARANTEE

PRO FORMA

PERFORMANCE GUARANTEE

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means: .....

Physical address: .....

"Employer" means: .....

"Contractor" means: .....

"Employer's Agent" means: .....

"Works" means: .....

"Site" means: .....

"Contract" means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties.

"Contract Sum" means: The accepted amount inclusive of tax of R .....

Amount in words: .....

"Guaranteed Sum" means: The maximum aggregate amount of R .....

Amount in words.....

"Expiry Date" means.....

CONTRACT DETAILS

Employer's Agent issues: Interim Payment Certificates, Final Payment Certificate and the Certificate Completion of the Works as defined in the Contract.

PERFORMANCE GUARANTEE

12. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.

13. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of issue by the Employer's Agent of the Certificate of Completion of the Works or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Employer's Agent and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.

14. The Guarantor hereby acknowledges that:

    14.1 any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;

    14.2 its obligation under this Performance Guarantee is restricted to the payment of money.

15. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:

    15.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Employer's Agent in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;

    15.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;

    15.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.

16. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address calling up this Performance Guarantee, such demand stating that:

    16.1 the Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 5; or

    16.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 5; and

    16.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.

17. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.

18. Where the Guarantor has made payment in terms of 5, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Performance Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.

19. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.

20. Payment by the Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.

21. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

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

23. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

24. This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.

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

Signed .....

Date

Guarantor's signatory (1) .....

Capacity .....

Guarantor's signatory (2) .....

Capacity .....

Witness signatory (1) .....

Witness signatory (2) .....

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023
FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

C1.6 AGREEMENT IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT NO 85 OF 1993)

AGREEMENT IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT NO 85 OF 1993)

THIS AGREEMENT made at .....

on this the ..... day of ..... in the year ……

between **CITY OF MBOMBELA** (hereinafter called "the Employer") of the one part, herein represented by

in his capacity as .....

and .....

(hereinafter called "the Mandatory") of the other part, herein represented by .....

.....

in his capacity as .....

WHEREAS the Employer is desirous that certain works be constructed, viz **UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME** and has accepted a Tender by the Mandatory for the construction, completion and maintenance of such Works and whereas the Employer and the Mandatory have agreed to certain arrangements and procedures to be followed in order to ensure compliance by the Mandatory with the provisions of the Occupational Health and Safety Act, 1993 (Act 85 of 1993);

NOW THEREFORE THIS AGREEMENT WITNESSETH AS FOLLOWS:

1 The Mandatory shall execute the work in accordance with the Contract Documents pertaining to this Contract.

2 This Agreement shall hold good from its Commencement Date, which shall be the date of a written notice from the Employer or Employer's Agent requiring him to commence the execution of the Works, to either

(a) the date of the Final Approval Certificate issued in terms of Clause 52.1 of the General Conditions of Contract (hereinafter referred to as "the GCC"),

(b) the date of termination of the Contract in terms of Clauses 54, 55 or 56 of the GCC.

3 The Mandatory declares himself to be conversant with the following:

(a) All the requirements, regulations and standards of the Occupational Health and Safety Act (Act 85 of 1993), hereinafter referred to as "The Act", together with its amendments and with special reference to the following Sections of The Act:

(i) Section 8 : General duties of employers to their employees;

(ii) Section 9 : General duties of employers and self-employed persons to persons other than employees;

(iii) Section 37 : Acts or omissions by employees or Mandatory, and

(iv) Subsection 37(2) relating to the purpose and meaning of this Agreement.

(b) The procedures and safety rules of the Employer as pertaining to the Mandatory and to all his subcontractors.

4 In addition to the requirements of Clause 33 of the GCC and all relevant requirements of the above-mentioned Volume 3, the Mandatory agrees to execute all the Works forming part of this Contract and to operate and utilise all machinery, plant and equipment in accordance with the Act.

5 The Mandatory is responsible for the compliance with the Act by all his subcontractors, whether or not selected and/or approved by the Employer.

6 The Mandatory warrants that all his and his subcontractors' workmen are covered in terms of the Compensation for Occupational Injuries and Diseases Act, 1993, which cover, shall remain in force whilst any such workmen are present on site. A letter of good standing from the Compensation Commissioner to this effect must be produced to the Employer upon signature of the agreement.

7 The Mandatory undertakes to ensure that he and/or subcontractors and/or their respective employers will at all times comply with the following conditions:

(a) The Mandatory shall assume the responsibility in terms of Section 16.1 of the Occupational Health and Safety Act. The Mandatory shall not delegate any duty in terms of Section 16.2 of this Act without the prior written approval of the Employer. If the Mandatory obtains such approval and delegates any duty in terms of section 16.2 a copy of such written delegation shall immediately be forwarded to the Employer.

(b) All incidents referred to in the Occupational Health and Safety Act shall be reported by the Mandatory to the Department of Labour as well as to the Employer. The Employer will further be provided with copies of all written documentation relating to any incident.

(c) The Employer hereby obtains an interest in the issue of any formal inquiry conducted in terms of section 32 of the Occupational Health and Safety Act into any incident involving the Mandatory and/or his employees and/or his subcontractors.

In witness thereof the parties hereto have set their signatures hereon in the presence of the subscribing witnesses:

SIGNED FOR AND ON BEHALF OF THE EMPLOYER: _____

WITNESS 1 _____ 2

NAME 1 _____ 2

(IN CAPITALS)

SIGNED FOR AND ON BEHALF OF THE MANDATORY: _____

WITNESS 1 _____ 2

NAME 1 _____ 2

(IN CAPITALS)

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

C1.7 CERTIFICATE OF AUTHORITY FOR SIGNATORY TO AGREEMENT IN TERMS OF OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT NO 85 OF 1993)

CERTIFICATE OF AUTHORITY FOR SIGNATORY TO AGREEMENT IN TERMS OF OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT NO 85 OF 1993)

The signatory for the company that is the Contractor in terms of the above-mentioned Contract and the Mandatory in terms of the above-mentioned Act shall confirm his or her authority thereto by attaching to this page a duly signed and dated copy of the relevant resolution of the Board of Directors.

An example is given below:

"By resolution of the Board of Directors passed at a meeting held on _____ 20 _____ ,

Mr/Ms _____ whose signature appears below, has been duly authorised to sign the AGREEMENT in terms of THE OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT 85 of 1993) on behalf of

_____

SIGNED ON BEHALF OF THE COMPANY :

IN HIS/HER CAPACITY AS :

DATE :

SIGNATURE OF SIGNATORY :

WITNESS: 1. _____ 2. _____

NAME (in capitals): 1. _____ 2. _____

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

PART C2 PRICING DATA

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

C2.1 PRICING INSTRUCTIONS

C2.1: PRICING INSTRUCTIONS

1 The Tender Data, the Contract Data, the Scope of Work, the Site Information and the Drawings shall be read in conjunction with the Schedule of Quantities.

2 The Schedule comprises items covering the Contractor's profit and costs of general liabilities and of the construction of Temporary and Permanent Works.

Although the Tenderer is at liberty to insert a rate of his own choosing for each item in the Schedule, he should note the fact that the Contractor is entitled, under various circumstances, to payment for additional work carried out and that the Employer's Agent is obliged to base his assessment of the rates to be paid for such additional work on the rates the Contractor inserted in the Schedule.

The measurement and payment clauses of each Specification, read together with the relevant clauses of the Specification Data, all set out which ancillary or associated activities are included in the rates for the specified operations.

3 Descriptions in the Schedule of Quantities are abbreviated and may differ from those in the Standardized and Specification Data. No consideration will be given to any claim by the Contractor submitted on such a basis. The Schedule has been drawn up generally in accordance with the latest issue of Civil Engineering Quantities[1]. Should any requirement of the measurement and payment clause of the appropriate Standardized or Specification Data be contrary to the terms of the Schedule or, when relevant, to the Civil Engineering Quantities, the requirement of the appropriate Standardized Specification or Specification Data as the case may be, shall prevail.

4 Unless stated to the contrary, items are measured and paid for net, in accordance with the Drawings, without any allowance having been made for waste.

5 The amounts and rates to be inserted in the Schedule of Quantities shall be the full inclusive amounts to the Employer for the work described under the several items. Such amounts shall cover all the costs and expenses that may be required in and for the construction of the work described, and shall cover the costs of all general risks, profits, taxes (but excluding value-added tax), liabilities and obligations set forth or implied in the documents on which the Tender is based.

6 An amount or rate shall be entered against each item in the Schedule of Quantities, whether or not quantities are stated. An item against which no amount or rate is entered will be considered to be covered by the other amounts or rates in the Schedule.

The Tenderer shall also fill in a rate against the items where the words "rate only" appears in the amount column. Although no work is foreseen under these items and no quantities are consequently given in the quantity column, the tender rates shall apply should work under these items actually be required.

Should the Tenderer group a number of items together and tender one sum for such group of items, the single tender sum shall apply to that group of items pro rata and not to each individual item, or should he indicate against any item that full compensation for such item has been included in another item, the rate for the item included in another item shall be deemed to be nil.

The tender rates, prices and sums shall, subject only to the provisions of the General Conditions of Contract, remain valid irrespective of any change in the quantities during the execution of the Contract.

1 The standard system of measurement of civil engineering quantities published by the South African Institution of Civil Engineers.

7 The quantities of work as measured and accepted and certified for payment in accordance with the General Conditions of Contract, and not the quantities stated in the Schedule of Quantities, will be used to determine payments to the Contractor. The validity of the Contract shall in no way be affected by **any** differences between the quantities in the Schedule of Quantities and the quantities certified for payment.

The ordering of materials shall **not** be based on the quantities in the Schedule of Quantities. Materials ordered from the Schedule of Quantities without prior confirmation by the Employer's Agent shall be at the risk of the Contractor. No compensation shall be paid for materials ordered erroneously and all costs shall be borne by the Contractor.

8 For the purposes of this Schedule of Quantities, the following words shall have the meanings hereby assigned to them:

Unit	:	The unit of measurement for each item of work as defined in the SANS 1200 Standardized Specification for Civil Engineering Construction or the Specification Data.
Quantity	:	The number of units of work for each item
Rate	:	The payment per unit of work at which the Tenderer tenders to do the work
Amount	:	The quantity of an item multiplied by the tender rate of the (same) item
Sum	:	An amount tender for an item, the extent of which is described in the Schedule of Quantities, the Specifications or elsewhere, but of which the quantity of work is not measured in units

9 The units of measurement indicated in the Schedule of Quantities are metric units. The following abbreviations may appear in the Schedule of Quantities:

mm	=	millimetre
m	=	meter
km	=	kilometre
km-pass	=	kilometre-pass
m^2	=	square metre
m^2-pass	=	square meter-pass
ha	=	hectare
m^3	=	cubic meter
m^3-km	=	cubic meter kilometre
kW	=	kilowatt
kN	=	kilo-Newton
kg	=	kilogram
l	=	litre
kl	=	kilolitre
Ml	=	mega litre
t	=	ton (1 000 kg)
%	=	per cent
MN	=	mega-Newton
MN-m	=	mega-Newton-meter
PC Sum	=	Prime Cost Sum
Prov Sum	=	Provisional Sum
Sum	=	Lump Sum

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

C2.2 SCHEDULE OF QUANTITIES

C2.2: BILL of QUANTITIES

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
PRELIMINARY AND GENERAL

SECTION A : PRELIMINARY AND GENERAL

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
A	SANS 1200 A & AB	**SECTION A : PRELIMINARY AND GENERAL**					
	8.3	**FIXED-CHARGE ITEMS**					
A.1	8.3.1	Contractual Requirements	Sum	1			
	8.3.2	Establish Facilities on the Site :					
		Facilities for Engineer (SANS 1200 AB)					
A.2	8.4.2.1	Contract nameboard (One only) (Refer to PS AB 5.1)	Sum	1			
	8.3.2.2	Facilities for Contractor					
A.3		a) Offices and storage sheds	Sum	1			
A.4		b) Workshops	Sum	1			
A.5		d) Living accommodation	Sum	1			
A.6		e) Ablution and latrine facilities	Sum	1			
A.7		f) Tools and equipment	Sum	1			
A.8		g) Water supplies, electric power and communications	Sum	1			
A.9		h) Dealing with water (Subclause A- 5.5)	Sum	1			
A.10		i) Access (Subclause A-5.8)	Sum	1			
	8.3.3	Other fixed-charge obligations					
A.11		i) Provision for all OHS requirements	Sum	1			
A.12		ii) Provision for Environmental Management Plan Regulations	Sum	1			
A.13	8.3.4	Remove Engineer's and Contractor's Site establishment on completion	Sum	1			
TOTAL CARRIED FORWARD							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
PRELIMINARY AND GENERAL

SECTION A : PRELIMINARY AND GENERAL

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
	8.4	**TIME-RELATED ITEMS**					
A.14	8.4.1	Contractual Requirements	Sum	1			
	8.4.2	Operate and maintain facilities on site:					
	8.4.2.1	Facilities for Engineer					
A.15	8.4.2.1	Name board (One only)	Sum	1			
	8.4.2.2	Facilities for Contractor for duration of construction.					
A.16		a) Offices and storage sheds	Sum	1			
A.17		b) Workshops	Sum	1			
A.18		d) Living accommodation	Sum	1			
A.19		e) Ablution and latrine facilities	Sum	1			
A.20		f) Tools and equipment	Sum	1			
A.21		g) Water supplies, electric power and communications	Sum	1			
A.22		h) Dealing with water (Subclause 5.5)	Sum	1			
A.23		i) Access (Subclause 5.8)	Sum	1			
	8.4.5	Other time-related obligations					
A.24		i) Provision for all OHS requirements	Sum	1			
A.25		ii) Provision for Environmental Management Plan Regulations	Sum	1			
TOTAL CARRIED FORWARD							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
PRELIMINARY AND GENERAL

SECTION A : PRELIMINARY AND GENERAL

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
	PS A 8.5	**SUMS STATED PROVISIONALLY BY ENGINEER**					
A.26		1) Community Liaison Officer	Prov Sum	1		70,000	00
A.27		2) Social Facilitator - nominated	Prov Sum	1		150,000	00
A.28		3) Environmental Control Officer - nominated	Prov Sum	1		140,000	00
A.29		4) OHS Agent - nominated	Prov Sum	1		210,000	00
A.30		5) New Building with guard house with ablution at WTW (Local Subcontractor)	Prov Sum	1		550,000	00
A.31		6) Paving of WTW Yard (Local Subcontractor)	Prov Sum	1		150,000	00
A.32		7) New "ClearVu" Security Fencing at WTW/reservoir (Local Subcontractor)	Prov Sum	1		220,000	00
A.33		8) Geophysical Investigation and Borehole Drilling Supervision	Prov Sum	1		200,000	00
A.34		9) Provisional Sum for bulk power supply by Eskom	Prov Sum	1		450,000	00
A.35		10) Overheads, charges and profit on item 1 to 9	%	2,140,000			
	PS A 8.7	**DAYWORKS**					
		a) Labour					
A.36		i) Un-skilled	hr	15			
A.37		ii) Semi-skilled	hr	15			
A.38		iii) Skilled	hr	15			
A.39		iv) Foreman	hr	20			
		b) Plant					
A.40		i) 5 ton tipper truck with operator	hr	15			
A.41		ii) 0.5 m³ excavator with operator	hr	15			
A.42		iii) 5000ℓ water truck with operator	hr	15			
A.43		iv) Bomag (BW 90) compactor with operator	hr	15			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER RETICULATION NETWORK

SECTION B : EARTHWORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
B		**SECTION B : EARTHWORKS**					
	SANS 1200 C	**SITE CLEARANCE**					
B.1	8.2.1	Clear vegetation and trees of girth up to 1 m for a 3 m wide strip along pipelines	m	4,000			
	8.2.2	Clear and remove trees and tree stumps of girth:					
B.2		i) over 1 m and up to and including 2 m	No	15			
	SANS 1200 DB	**EXCAVATION (Pipe Trenches)**					
	8.3.2	a) Excavate in ALL materials except HARD, including sieving and backfilling, compacted to 93% MAASHTO density and dispose of surplus material (erf connections excluded)					
B.3		i) Up to 1,5 deep	m	3,100			
B.4		ii) Over 1,5 up to 2,5m deep	m	500			
B.5		ii) Over 2,5 up to 3,5m deep	m	400			
	8.3.2	b) Extra-over item 8.3.2a for					
B.6		ii) Hard rock excavation (Provisional)	m^3	75			
B.7	8.3.2	c) Excavate and dispose of unsuitable material from trench bottom (Provisional)	m^3	30			
B.8	8.3.3.1	c) Import backfill material from commercial or off-site sources selected by the contractor (Provisional)	m^3	105			
B.9	8.3.3.3	Compacting in road reserves where the road/street is crossed with the pipeline	m^3	50			
B.10	8.3.3.4	b) Overhaul (provisional)	m^3km	315			
TOTAL CARRIED FORWARD							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER RETICULATION NETWORK

SECTION B : EARTHWORKS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
	PS DB 8.3.5	Existing Services that intersect or adjoin a pipe trench					
B.11		a) Services that intersect a trench	No	5			
B.12		b) Services that adjoin a trench	m	80			
	PS DB 8.3.6.1	Reinstate road surface complete with all courses					
B.13		a) Gravel causeway street	m²	30			
B.14		b) 80mm paving bricks	m²	25			
B.15	PS DB 8.3.7	Accommodation of Traffic in Village	Sum	1			
	SANS 1200D 8.3.8	**EXISTING SERVICES**					
	8.3.8.1	Location					
B.16		c) Excavate by hand in soft material to expose water, sewage, Telkom, and electrical services	m³	15			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER RETICULATION NETWORK

SECTION C : BEDDING

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C	SANS 1200 LB	**SECTION C: BEDDING** Class C, Rigid pipes: Provision of selected granular material for bedding cradle					
C.1	8.2.1	a) Trench excavation	m³	780			
C.2	8.2.2.2	b) Borrow pits or commercial (Provisional) Provision of selected fill material for flexible pipe blanket	m³	490			
C.3	8.2.1	a) Trench excavation	m³	780			
C.4	8.2.2.2	b) Borrow pits or commercial (Provisional)	m³	490			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER RETICULATION NETWORK

SECTION D: MEDIUM PRESSURE PIPELINES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
D	SANS 1200L	**SECTION D: MEDIUM PRESSURE PIPELINES**					
	PS L 8.2.1	Supply, handle, lay, and bed in Class C bedding, the following pressure pipes complete with couplings, testing, and disinfecting:					
D.1		a) 90 mm diam uPVC Class 9	m	4,000			
	8.2.1.3	Galvanised Steel (Class extra light, 0-20 Bar)					
D.2		a) 90 mm (Klambon or similar - grooved, including couplings, bolts, and gaskets complete)	m	270			
		SPECIALS AND FITTINGS					
	8.2.2	Extra-over 8.2.1 for the supply, laying & bedding of Class 16 specials complete with disinfecting:					
		Bends for uPVC (Cast Iron Spigot & Socket)					
D.3		a) 90 mm diam 11.25 deg. bend	No	4			
D.4		b) 90 mm diam 22.5 deg. bend	No	13			
D.5		c) 90 mm diam 45 deg. bend	No	2			
D.6		d) 90 mm diam 90 deg. bend	No	7			
		T-Piece for uPVC (Cast iron spigot & socket Class 16)					
D.7		a) 90 mm x 90 mm x 90 mm	No	2			
		End caps (Cast iron) for uPVC pipes					
D.8		a) 90 mm	No	1			
		Special fittings for Galvanized steel (Klambon or similar - grooved) pipes (0-20 Bar) including one coupling per fitting supplied.					
		i) 22,5 deg bends					
D.9		a) 90 mm dia.	No	2			
TOTAL CARRIED FORWARD							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER RETICULATION NETWORK

SECTION D: MEDIUM PRESSURE PIPELINES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
	PS L 8.2.3	Extra-over 8.2.1 for the supplying, fixing and bedding of Class 16 flanged AVK Gate Valves (spigot and socketed type)					
D.10		i) 90 mm	No	5			
D.11	PS L 8.2.11	Anchor/thrust blocks and pedestals Class 19/20 MPa	m³	15			
D.12	PS L 8.2.13	Supply and install pre-cast lockable valve boxes (Salberg or similar) as per drawing	No	5			
D.13	PS L 8.2.17	Pipe markers	No	15			
D.14	PS L 8.2.18	Supply all material and install communal pillar tap complete as per Drawing - Typical Water Detail	No	10			
		GENERAL					
		"ClearVu" Fencing Reservoir					
D.15		Supply and install a 1.8m high "ClearVu" Security Fence with "Smart Coil" razor wire on top at the sectional steel tank reservoir and WTPP	m	120			
D.16		Supply and install a 2.4m x 1.8m high "ClearVu" double leaf security gate with "Smart Coil" razor wire on top at the sectional steel tank reservoir and WTPP	No	2			
		Access Road Improvement					
D.17		Supply G6 quality material (SANS 1200 M) to site from a commercial source	m³	400			
D.18		Rip the in-situ material 150mm deep, scarify it, water it to optimum moisture content and compact it with a 20-ton padfoot roller (not smooth-drum) with 6-passes.	m³	270			
D.19		Spread G6 quality imported material 200mm thick, scarify it, water it to optimum moisture content and compact it with a 20-ton padfoot roller with 8-passes.	m³	400			
D.20		Finish-off the compacted material	m²	2,000			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
LARGE DIAMETER BOREHOLE

SECTION E: ESTABLISHMENT AND INTER-BOREHOLE MOVES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E	PA 2.2	**SECTION E: ESTABLISHMENT (per project)**					
		Provision for Geohydrologist for the sighting of large diameter borehole					
E.1		a) Geohydrologist	hr	16			
E.2		b) Field Survey Cost	hr	16			
E.3		c) Documentation / Report for large diameter borehole drilled	Sum	1			
E.4		d) Geophysical Investigation	hr	16			
E.5		e) Traveling Cost and time	Sum	1			
E.6		Establishment of drilling rig inclusive of provision for all types of drilling techniques for large diameter borehole construction	Sum	1			
E.7	PA 2.4	WATER HAULAGE	m^3	50			
	PA 2.5	TRANSPORT OF SPECIAL ITEMS					
E.8		Transport	km	120			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
LARGE DIAMETER BOREHOLE

SECTION F: ROTARY PERCUSSION AIR FLUSH DRILLING

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
F		**SECTION H: ROTARY PERCUSSION AIR FLUSH DRILLING** (Drilling method used where geological formation comprises consolidated rock with limited overburden)					
	PA 2.6	AIR PERCUSSION DRILLING (abrasive rock) For depths : 0 m up to 100 m for boreholes with a diameter of:					
F.1		a) 400 mm	m	90			
	PA 2.7	AIR PERCUSSION DRILLING (boulders & alluvium) For depths: 0 m up to 50 m for boreholes with a diameter of :					
F.2		a) 400 mm	m	50			
	PA 2.10	REAMING For depth range: 0 m up to 150 m for a borehole with a diameter of :					
F.3		b) 400 mm	m	90			
	PA 2.11	ROTARY MUD DRILLING For depth range: 0 m up to 150 m for a borehole with a diameter of:					
F.4		a) 400 mm	m	50			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
LARGE DIAMETER BOREHOLE

SECTION G: BOREHOLE CONSTRUCTION

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
G		**SECTION I: BOREHOLE CONSTRUCTION**					
G.1	PA 2.12	Development of Borehole	hr	28			
G.2	PA 2.14	Insertion of casing	m	100			
G.3	PA 2.16	Installation of factory perforated casing and/or screens under instruction and supervision of the Engineer.	m	100			
G.4	PA 2.18	Formation stabilizer / gravel pack (Grain size as specified by the Engineer)	m^3	12			
G.5	PA 2.19	Filter pack (Grain size as specified by the Engineer and provision for a minimum of 0.5 cubic metres supplied at a time)	m^3	12			
G.6	PA 2.20	Grout backfill / Bentonite seal	m	14			
G.7	PA 2.21	Capping of boreholes	No	1			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
LARGE DIAMETER BOREHOLE

SECTION H: SUPPLY OF CASING MATERIAL

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
H		**SECTION J: SUPPLY OF CASING MATERIAL**					
	PA 2.22	SUPPLY MILD STEEL CASINGS					
		a) Plain Casing					
		For OD & Wall Thickness:					
H.1		2) 400 x 12 mm	m	100			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
LARGE DIAMETER BOREHOLE

SECTION I: TESTING OF BOREHOLES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
I	PA 2.24	**SECTION K: TESTING OF BOREHOLES**					
		a) Setup, test run, installation, calibration of equipment, borehole disinfection and protection for each borehole tested and drilling supervision by geohydrologist					
I.1		i) For yield up to 15 l/s and 90 m deep	No	1			
I.2		c) Sequential step-draw-down tests of 110 minutes duration	hr	36			
I.3		d) Recovery measurement to 80% of static water level	hr	36			
		e) Constant discharge test					
I.4		i) For yield up to 15 l/s	hr	36			
I.5		ii) Recovery measurement to 80 % of static water level	hr	36			
I.6		f) Sampling of water and test for human consumption	No	1			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
LARGE DIAMETER BOREHOLE

SECTION J: ELECTRICAL EQUIPTMENT INSTALLATIONS

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
J		**SECTION J: PUMP EQUIPMENT INSTALLATION**					
J.1		Supply, install, commission and test all mechanical, civil and electrical equipment for a submersible Grundfos borehole pump (or similar) with a duty point of 15 kl/h @ 112m head. Three-phase power is available. Trenching for pipes and cables measured under Section B. Electrician to supply a COC and panel builder to provide a SANS registration certificate.					
J.2		a) Pump (15 kl/h @ 140m head) with supplier's pump controller for protection. Pump controller to be installed in WTW building.	Sum	1			
J.3		b) Supply and install electrical supply cable(s), suitable for the pump application as per specifications in the tender document.	m	350			
J.4		c) Supply and install a 90 mm diam HDPE pipe (Cl 16) from the submersible pump to the WTW complete with all required couplings and fittings. The line length is 200m.	m	350			
J.5		d) Commission and test the operation and protection controls of the pump.	Sum	1			
TOTAL CARRIED FORWARD TO SUMMARY							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER TREATMENT PACKAGE PLANT

SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
K		**SECTION K: 200 kl WATER TREATMENT PACKAGE PLANT** A new water treatment package plant with a capacity of 200 kl/d (over 15-hours) must be designed, manufactured, supplied, installed, and commissioned by a specialist contractor. The treatment process design must be done by a suitably chemical specialist and all the designs must be submitted to the Engineer for review and approval before any manufacturing may commence. The scheduled items listed below indicate the minimum specifications as required. Raw water will be withdrawn from a large diameter borehole (400 mm) which will be drilled next to the Suidkaap River. The treatment process stages must be: Pre-chlorination Coagulant dosage (pH adjust) Flash Mixing (in-line) Flocculation Settling (Clarification) Filtration (pressure) Stabilization Disinfection (chlorination) Design, fabricate and install the following:					
K.1		Raw-water no-flow switch, installed to inlet/dosing pipework.	Sum	1			
K.2		Pre-chlorination, allowance to be made in the supply main for an in-line dosing point and pipework, capable of dosing 500 ml/hour of 15% Sodium Hypo-Chloride solution.	Sum	1			
K.3		Coagulant dosage, to the inlet pipework, before and between the in-line static mixers for a dosage point and pipework, capable of dosing 180 ml/hour (12 mg/l).	Sum	1			
TOTAL CARRIED FORWARD							

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SANS 1200
WATER TREATMENT PACKAGE PLANT

SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
		Flocculation shall be incorporated into the first compartment of the steel clarifier. It should discharge at TWL of the clarifier without entry turbulence. A retention time of 15-20 min at nominal treatment rate is required giving a tank volume of 5 to 7 m^3. Flocculation must be achieved mechanically with VSD drives on motors so that the speed can be varied for optimal performance. The clarifier must comprise 2 x Inclined Lamella sheets. The clarifier structure must be robust in design and fabrication to ensure that strength and rigidity is not compromised. The unit must conservatively produce 15 kl/h of settled water. The up-flow velocity shall NOT exceed 1.5 m/h. The tank must be fabricated from mild steel and be epoxy coated to a minimum DFT of 250 micron. A final polyurethane topcoat must be applied to all surfaces for UV protection to prevent "chalking" of the epoxy paint. All supporting framework and the V-notch weir plates must be coated 550 microns thick. The Lamella sheets shall be PVC whilst the 8mm rods, brackets and fasteners, must be fabricated all from 304 SS. The price must include for all pipework in 150NB, valves, gaskets and fasteners, between the clarifier and the alancing tank, all made from mild steel. The clarifier must have automatic electric desludging valves.					
TOTAL CARRIED FORWARD							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER TREATMENT PACKAGE PLANT

SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
		One sludge collection hopper must be incorporated into the design of the clarifier, with a perforated draw-off pipe at the bottom of each trough. Each draw-off pipe must be automatically or manually controlled by an actuated butterfly or versatrol valve discharging into a sludge channel or pipe. The waste pipe/channel will discharge the sludge into a sludge dam. The sizes of the perforations on the draw off pipes must be carefully calculated to allow for the proper and complete removal of sludge along the pipe. The sides of the troughs will be formed at 60 degrees to ensure that the sludge completely settles to the bottom of the hopper and does not accumulate along the sides. The clarified water should discharge by overflow from V-notch weir collector troughs. The clarified water must gravity flow with uPVC pipes to a 5 kl buffer tank.					
K.4		Manufacture/procure, deliver to site and install a 15 kl/h rectangular steel clarifier. Price to include all inlet, outlet and desludge pipework, pneumatic valves, PLC, etc. for the full automated operation of the clarifier with access ladders walkways, railings etc.	Sum	1			
K.5		Extra-over the above for an elevated access platform of 1.2m wide 'Rectagrid' walkway over the clarifier, complete with access ladder and hand railing giving safe access to the clarifier.	Sum	1			
K.6		Manufacture/procure, deliver to site and install a buffer tank from where the filter pumps will pump from (5 kl).	Sum	1			
TOTAL CARRIED FORWARD							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER TREATMENT PACKAGE PLANT

SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
K.7		Filter Booster Pumps: Manufacture/procure, deliver to site and install two filter booster pumps (duty & standby), each capable of delivering 4.5 l/s, 16.5 m³/hour, on a manifold such that either pump can be used for all the filters. Pumps to be vertical centrifugal type equipped with energy efficient electrical motors, all controlled by Motor Control Centre (measured elsewhere) with Variable Speed Drives. Pressure Filters: For a plant of this size one pressure filter is preferred for reason of simplicity. Overflow from the clarifier will flow to a buffer tank of at least 5 kl from which it will be pumped to the filters by pumps operating on level probe control. The filter must be sized for a treatment rate of 16.5 m³/h (10% higher than raw pump rate) to avoid bottlenecking. Filter to be equipped with a removable 'rain plate' and must be manufactured from 10% torospherical dished ends and consist of 8mm 430A boiler plate. A minimum of 55 - 60 nozzles per m². Filters have to be sized at a filtration rate of 6-7 m/h. For reasons of robustness of equipment and ease of repair the filters should be of steel construction with suitable corrosion protection. The filter bed should be dual filter media, 1.2 m deep and space shall be allowed for bed expansion when backwashing so that there is no loss of media. The filter media shall be supported by a suitable base plate with nozzles for collection of filtered water and for backwashing. The backwash rate shall be selected to suit the media such that washing is effective without incurring loss of media. Manual backwashing is required. A consecutive air and water backwashing should be used. Air scour to be provided at a rate of 50m³/m²/h filter area by means of an air blower.	Sum	1			
TOTAL CARRIED FORWARD							

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SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
K.8		Manufacture/procure, deliver to site and install one pressure filter with a combined capacity of, 15 m³/hour and a maximum filtration rate of 6-7m/hour. Price to include all inlet, outlet and backwash pipework, pneumatic valves, PLC, etc. for the semi-automated operation. (Semi-auto operation meaning that the operator shall manually initiate the backwash cycle for each filter at a time, by selector switch. Backwash water to be supplied by filter booster pumps)	Sum	1			
K.9		Air Blower: Manufacture/procure, deliver to site and install an air blower at a rate 50m³ per m² filter area. (Duty only configuration)	Sum	1			
		Dosing: All dosing equipment to be interlocked with no-flow switch on inlet pipework. Design, supply and install the following:					
K.10		Two (2) dosage pumps, each with a 500 ml/hour feed rate capacity, one to supply post-chlorination, one to supply pre-chlorination.	Sum	1			
K.11		Two (2) 50-liter storage tanks (PVC or similar) for 15% Sodium Hypo-chloride solution, one for dosing and one for filling.	Sum	1			
K.12		Two (2) dosage pumps, each with a 1000 ml/hour feed rate capacity, one operating and one standby.	Sum	1			
K.13		Two (2) 50-liter storage tanks (PVC or similar) for coagulant with common manifold for both pumps, one for dosing and one for filling, allowance to be made for a potable water supply for dilution and washing.	Sum	1			
K.14		Allow for full screening tests to identify the best suitable coagulant and at least 100 liters of coagulant after plant has been commissioned.	Sum	1			
TOTAL CARRIED FORWARD							

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UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
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WATER TREATMENT PACKAGE PLANT

SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
K.15		20-litre DKM Floc 555 (Or most suitable, as tested)	Sum	1			
K.16		20-litre Sodium Hypo-Chloride	Sum	1			
K.17		Two (2) dosage pumps on a common manifold for a 5% soda ash solution, each with a 12 litre/hour feed rate capacity, one operating and one standby.	Sum	1			
K.18		Two (2) 50-litre storage tanks (PVC or similar) for pH correction with common manifold for both pumps, one for dosing and one for filling, allowance to be made for a potable water supply for dilution and washing.	Sum	1			
		<u>Interconnecting Pipework</u>					
K.19		Manufacture/procure, deliver to site and install all interconnecting pipework for package plant (welded PVC with flanges at critical points for ease of removal of filters, pumps etc. for repair or maintenance).	Sum	1			
K.20		Procure, deliver to site and install venturi type flow meter on filtered water, including throttling valves.	Sum	1			
K.21		Allowance for all additional items, probes, valves, electrical cables, pipework, etc. for specific package WTW plant to operate efficiently.	Sum	1			
K.22		<u>Drawings:</u> Allowance to be made to submit detailed layout drawings, construction drawings, line diagrams and as-built drawings.	Sum	1			
K.23		Allowance to be made for plant to switch off automatically when: 1) The no-flow switch on the inlet pipework detects no flow and, 2) the buffer tank where the filters draw water from is on minimum level, until the operator resets the system and press the start button to start plant operation again.	Sum	1			
TOTAL CARRIED FORWARD							

CONTRACT NO: COM46/2023
UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME
SANS 1200
WATER TREATMENT PACKAGE PLANT

SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
		ELECTRICAL SUPPLY & SWITCH GEAR FOR PACKAGE WTW					
		ELECTRICAL MOTOR CONTROL CENTRES, SWITCHGEAR & CABLES All electrical installations must be done by a certified electrician in accordance with the latest issue of the South African Institute of Electrical Engineer's Standard Regulations.					
		Supply, installation, commissioning and testing of the following:					
K.24		Supply & install new Main Distribution Kiosk, for supply to Package WTW MCC	No	1			
K.25		Supply and install Treatment Works MCC panel in WTW building including VSD starters to filter booster pumps, blower, PLC's, actuators & automated operation of dosing and filtration systems etc.	No	1			
K.26		Allow for domestic electrical wiring of 35 m² WTW building and WTW LED flood lights e.g., plugs lights etc.	No	1			
K.27		Supply & install new lock stops	Sum	1			
K.28		Supply & install new float switch	Sum	1			
K.29		Supply & install new no-flow switch	No	2			
K.30		Supply & install new LED 5' twin fluorescent fittings	No	2			
K.31		Supply & install new LED bulkhead fittings	No	3			
K.32		Supply & install new daylight switch	No	1			
K.33		Supply & install new light switches	No	2			
K.34		Supply & install new socket outlets	No	4			
K.35		Supply & install new welding plug	No	1			
TOTAL CARRIED FORWARD							

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SECTION K: 200 kl PACKAGE WATER TREATMENT PLANT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
BROUGHT FORWARD							
K.36		Supply & install new lightning protection for WTW	No	1			
		CABLES (To be confirmed)					
K.37		25mm² x 4 core & ECC (Meter Panel to new DB Kiosk)	m	50			
K.38		25mm² x 4 core & ECC (New DB Kiosk to new Package Plant)	m	50			
		CABLE ENDS					
K.39		25mm² x 4 core & ECC	No	4			
K.40		Cable Trench & backfilling	m	60			
K.41		Junction boxes	Sum	1			
K.42		P2200 trunking & conduit 20mm PVC & fittings	Sum	1			
		GENERAL					
K.43		Issue an electrical Certificate of Compliance upon completion and testing of installation.	Sum	1			
K.44		Provision of a 10 m² open side industrial steel shed to cover the WTW package plant equipment.	Prov Sum	1		50,000	00
K.45		Overheads, charges, and profit on above item	%	50,000			
TOTAL CARRIED FORWARD TO SUMMARY							

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

SUMMARY OF SCHEDULE OF QUANTITIES

SECTION	DESCRIPTION	PAGE	AMOUNT
A	Preliminary & General	C.2.2-4	
B	Earthworks	C.2.2-6	
C	Bedding	C.2.2-7	
D	Medium Pressure Pipelines	C.2.2-9	
E	Establishment and Inter-Borehole Moves	C.2.2-10	
F	Rotary Percussion Air Flush Drilling	C.2.2-11	
G	Borehole Construction	C.2.2-12	
H	Supply of Casing Material	C.2.2-13	
I	Testing of Boreholes	C.2.2-14	
J	Electrical Equipment Installations	C.2.2-15	
K	200kl Package Water Treatment Plant	C.2.2-23	
1	**SUB-TOTAL**		
	Allowance for CPA (10% of 1)		
	Allowance for Contingencies (10% of 1)		
2	17. **TOTAL AMOUNT OF TENDER**		
	18. Plus 15% VAT of 2		
TOTAL AMOUNT CARRIED TO FORM OF OFFER			

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

PART C3 SCOPE OF WORKS

PART C3: SCOPE of WORK

CONTENTS

C3.1: DESCRIPTION of WORKS

C3.1.1 EMPLOYER'S OBJECTIVES

The Employer requires the upgrading of the Mlambongwane water supply scheme.

The Employer desires that the work required be of a high standard and be completed in the shortest practical time whilst creating jobs for local labourers and contractors.

C3.1.2 OVERVIEW OF THE WORKS

The contract entails the upgrading of the raw water withdrawal point next to the Noordkaap River, the construction of a new water treatment package plant, a new building for the water treatment package plant and the installation of a reticulation network with RDP standard pillar taps for Mlambongwane Village.

C3.1.3 EXTENT OF WORKS

The Works to be carried out by the Contractor under this Contract comprise mainly the following:

(a) Drilling, testing, and equipping of a large diameter borehole (400 mm) next to the Noordkaap River.
(b) Process design, manufacture, supply, and installation of a new 0.2 Ml/d water treatment package plant.
(c) Supply, installation and commissioning of all mechanical equipment, pumps, fittings, pipework, valves, etc. at the water treatment package plant.
(d) Supply, installation and commissioning of all electrical equipment, switchgear, controls, panels, cables/wiring etc. at the water treatment package plant.
(e) A new building for the package plant. (*allocated to local subcontractor*)
(f) Building of a new guard house with ablution facility. (*allocated to local subcontractor*)
(g) Paving of the water treatment package plant yard. (*allocated to local subcontractor*)
(h) Fencing of the water treatment package plant yard with ClearVu or similar. (*allocated to local subcontractor*)
(i) Fencing of the existing sectional steel tank reservoir with ClearVu or similar. (*allocated to local subcontractor*)
(j) Installation of a water reticulation network (90 mm diam) with RDP standard pillar taps in Mlambongwane Village.
(k) Commissioning and operation of the entire water supply system.
(l) Finishing-off the site.
(m) Correction of defects in the Works in accordance with the requirements specified in the Contract Documents.

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

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

C3.1.4 LOCATION OF THE WORKS

The latitude and longitude of the site is: 25°38’31.18” S & 31°02’31.12” E.

C3.1.5 TEMPORARY WORKS

None is required.

C3.2: ENGINEERING

C3.2.1 DESIGN

(a) The Employer is responsible for the design of the permanent Works as reflected in the Contract Documents unless otherwise stated.

(b) The Contractor is responsible for the design of the temporary Works (if applicable) and their compatibility with the permanent Works.

(c) The Contractor shall supply all details necessary to assist the Employers Agent in the compilation of the as-built drawings.

C3.2.2 EMPLOYER'S DESIGN

The Employer's Design is contained in the Tender Documentation and Drawings. Amendments to the design, if necessary, will be issued during the construction phase.

C3.2.3 CONTRACTOR'S DESIGN

Where the Contractor is to supply the design of designated parts of the permanent Works or temporary Works, he shall supply full working drawings supported by a professional engineer's design certificate.

C3.2.4 DRAWINGS

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

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

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

The Drawings prepared by the Employer for the permanent Works are listed below and are bound in a separate document or is attached at the back of this volume. The Employer reserves the right to issue and/or amended additional drawings during the Contract.

Drawing Number	Title
NS3306/01	Reticulation Layout
NS3306/02	Typical Water Detail
NS3306/03	Pipe and Valve Markers
NS3306/04	Thrust Block Detail
NS3306/04	Contract Nameboard

C3.2.5 DESIGN PROCEDURES

Not applicable.

C3.3: PROCUREMENT

C3.3.1 PREFERENTIAL PROCUREMENT

C3.3.1.1 Requirements

Tenders will be evaluated in terms of the City of Mbombela Preferential Procurement Policy. Points will be awarded for price and specific contract participation goals as contained in the Tender Data.

C3.3.1.2 Resource standard pertaining to targeted procurement

The Preferential Procurement Policy (PPP) of the City of Mbombela is applicable to this project. Refer to the Tender Data.

C3.3.2 SUBCONTRACTING

C3.3.2.1 Scope of mandatory subcontract works

Local subcontractors should be considered provided they are capable.

C3.3.2.2 Preferred subcontractors/suppliers

Where possible, local subcontractors should be considered for subcontract work provided they are capable.

C3.3.2.3 Subcontracting procedures

The contractor is solely responsible for negotiating with local subcontractors.

C3.3.2.4 Attendance on subcontractors

Not applicable.

C3.4: CONSTRUCTION

C3.4.1 WORKS SPECIFICATIONS

C3.4.1.1 Applicable SANS 1200 Standardized Specifications for Civil Engineering Construction

(a) The following SANS 1200 Standardized Specifications for civil engineering construction are applicable:

SANS 1200 A	:	General (1986)
SANS 1200 AA	:	General (Small Works) (1986)
SANS 1200 AB	:	Engineer's office (1986)
SANS 1200 C	:	Site clearance (1982)
SANS 1200 D	:	Earthworks (1988)
SANS 1200 DA	:	Earthworks (small works) (1990)
SANS 1200 DB	:	Earthworks (pipe trenches) (1989)
SANS 1200 DM	:	Earthworks (roads, subgrade) (1981)
SANS 1200 G	:	Concrete (structural) (1982)
SANS 1200 L	:	Medium-pressure pipelines (1983)
SANS 1200 LB	:	Bedding (pipes) (1983)
SANS 1200 M	:	Roads (General) (1981)
SANS 1200 ME	:	Subbase (1981)
SANS 1200 MF	:	Base (1981)

(b) The term "project specification" must be replaced by "scope of works" wherever it appears in these standardized specifications.

(c) The term "Engineer" must be replaced by "Employer's Agent" wherever it appears in these standardized specifications

C3.4.1.2 National and International Standards

Not applicable.

C3.4.1.3 Project and Particular Specifications

Section 2: Project Specifications – SANS 1200
Section 3: Particular Specifications – Building Works (SANS 10400)
Section 4: Particular Specifications – Mechanical & Electrical
Section 5: Particular Specifications – Boreholes

C3.4.1.4 Variations and Additions to the SANS 1200 Standardized Specifications for Civil Engineering Construction

Variations and additions to the SANS 1200 Standardized Specifications listed in C3.4.1.1 and the Particular Specifications (if applicable) listed in C3.4.1.3 are given in section C3.4.6.

C3.4.2 SITE ESTABLISHMENT

C3.4.2.1 Services and facilities provided by the Employer

(a) Water sources

Reticulated potable water supply is not available in the vicinity of the site.

The responsible water supply authority around the site is City of Mbombela.

Should the Contractor, in complying with his obligations in terms of subclause C3.4.2.2(b): Water, wish to utilise such water supply, he shall himself be responsible for making his own arrangements with the responsible water supply authority for the supply of all water that he may require from such reticulation network for construction purposes as well as for domestic consumption.

(b) Electricity supply

Reticulated electrical power supply is not available in the vicinity of the site.

The responsible electricity supply authority around the site is Eskom.

Should the Contractor, in complying with his obligations in terms of subclause C3.4.2.2(c): Electricity, wish to avail himself of such supply, he shall, in accordance with the provisions of subclause C3.4.2.2(c), and at his own cost, be responsible for making his own arrangements with the responsible electricity supply authority for the supply of all electrical power he may require from such reticulation network for construction purposes as well as for domestic consumption.

(c) Excrement disposal

Water borne type disposal systems does not exist in the vicinity of the site.

The responsible sewage disposal authority is City of Mbombela.

Should the Contractor, in complying with his obligations in terms of subclause C3.4.2.2(d): Excrement disposal, wish to avail himself of such facility, he shall, in accordance with the provisions of subclause C3.4.2.2(d), and at his own cost, be responsible for making his own arrangements with the responsible disposal authority, and for making such connections he may require to the available services.

(d) Area for contractor's site establishment

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

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

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

C3.4.2.2 Facilities provided by the Contractor

(a) Facilities for the Engineer

The Contractor shall provide on the site, for the duration of the Contract the following facilities for the Engineer:

Refer to applicable specifications in C3.4.1.1.

(b) Water

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

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

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

All water provided by the Contractor for construction purposes shall be clean, free from undesirable concentrations of deleterious salts and other materials and shall comply with any further relevant specifications of the Contract. The Contractor shall, whenever reasonably required by the Engineer, produce test results demonstrating such compliance. Water provided by the Contractor for human consumption shall be healthy and potable to the satisfaction of the health authorities in the area of the site.

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

(c) Electricity

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

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

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

(d) Excrement disposal

The Contractor shall, at his own expense, be responsible for safely and hygienically dealing with and disposing of all human excrement and similar matter generated on the site during the Contract, to the satisfaction of the Engineer and the responsible health authorities in the area of the site.

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

No separate payment will be made to the Contractor in respect of discharging his obligations in terms of this subclause and the costs thereof shall be deemed to be included within the Contractor's tendered Preliminary and General Items.

C3.4.2.3 Site usage

The Contractor's employees will not be allowed to stay on site except for the duration of a working day. The only person to be allowed on site for the duration of a calendar day will be the site guard(s).

Access to the site will be in a controlled manner. People visiting the site will have to sign in and out daily.

C3.4.2.4 Permits and way leaves

The Employer shall be responsible to obtain permits and/or way leaves if required for this Contract.

C3.4.2.5 Features requiring special attention

(a) Site maintenance

During progress of the work and upon completion thereof, the site of the Works shall be kept and left in a clean and orderly condition. The Contractor shall store materials and equipment for which he is responsible in an orderly manner and shall keep the site free from debris and obstructions.

(b) Testing and quality control

(i) Contractor to engage services of an independent laboratory

Notwithstanding the requirements of the Specifications pertaining to testing and quality control, the Contractor shall engage the services of an approved independent laboratory to undertake all testing of materials, the results of which are specified in, or may reasonably be inferred from, the Contract. These results will be taken into consideration by the Engineer in deciding whether the quality of materials utilised, and workmanship achieved by the Contractor comply with the requirements of the Specifications. The aforegoing shall apply irrespective of whether the specifications indicate that the said testing is to be carried out by the Engineer or by the Contractor.

The Contractor shall be responsible for arranging with the independent testing laboratory for the timeous carrying out of all such testing specified in the Contract, at not less than the frequencies and in the manner specified. The Contractor shall promptly provide the Engineer with copies of the results of all such testing carried out by the independent laboratory.

(ii) Additional testing required by the Engineer

In addition to the provisions of subclause C3.4.2.5(b)(i): Contractor to engage services of an independent laboratory, the Engineer shall be entitled at times during the Contract to require that the Contractor arrange with the independent laboratory to carry out any such tests, additional to those described in subclause C3.4.2.5(b)(i), at such times and at such locations in the Works as the Engineer shall prescribe. The Contractor shall promptly and without delay arrange with the independent laboratory for carrying out all such additional testing as required by the Engineer, and copies of the test results shall be promptly submitted to the Engineer.

(iii) Costs of testing

(a) Tests in terms of subclause C3.4.2.5(b)(i)

The costs of all testing carried out by the independent laboratory in accordance with the requirements of subclause C3.4.2.5(b)(i), above shall be borne by the Contractor and shall be deemed to be included in the tendered rates and prices for the respective items of work as listed in the Schedule of Quantities and which require testing in terms of the Specifications. No separate payments will be made by the Employer to the Contractor in respect of any testing carried out in terms of subclause C3.4.2.5(b)(i).

Where, as a result of the consistency of the materials varying or as a result of failure to meet the required specifications for the work, it becomes necessary to carry out additional tests (eg re-tests on rectified work and/or replacement materials), the costs of such additional testing shall be for the Contractor's account.

(b) Additional tests required by the Engineer

The costs of any additional tests required by the Engineer in terms of subclause C3.4.2.5(b)(ii): Additional testing required by the Engineer, shall be reimbursed to the Contractor against substitution of the Provisional Sum allowed therefore in the Schedule of Quantities; provided always that the costs of any such additional tests ordered by the Engineer, the results of which indicate that the quality of the materials utilised and/or the standard of workmanship achieved are/is not in accordance with the specifications, shall not be reimbursable to the Contractor.

(c) Subcontractors

All matters pertaining to subcontractors (including Selected Subcontractors) and the work executed by them shall be dealt with directly between the Engineer and the Contractor in the context of all subcontract work being an integral part of the Works for which the Contractor is responsible.

The Engineer will not liaise directly with any subcontractors, nor will he issue instructions concerning the subcontract works directly to any subcontractor.

All matters arising from the subcontract agreements shall be dealt with directly between the Contractor and the subcontractors and the Engineer will not become involved.

(d) Opening up and closing of designated borrow pits

Refer to standardized and or projects specifications.

(e) Access to properties

The Contractor shall organise the work to cause the least possible inconvenience to the public and to the property owners adjacent to or affected by the work, and except as hereunder provided, shall at all times provide and allow pedestrian and vehicular access to properties within or adjoining or affected by the area in which he is working.

If, as a result of restricted road reserve widths and the nature of the work, the construction of bypasses is not feasible, construction shall be carried out under traffic conditions to provide access to erven and properties.

Notwithstanding the aforegoing, the Contractor may, with the prior approval of the Engineer (which approval shall not be unreasonably withheld), make arrangements with and obtain the acceptance of the occupiers of erven and properties to close off part of a street, road, footpath or entrance temporarily, provided that the Contractor duly notifies the occupiers of the intended closure and its probable duration, and reopens the route as punctually as possible. Where possible, such streets, roads, footpaths and entrances shall be made safe and reopened to traffic overnight.
Such closure shall not absolve the Contractor from his obligations under the Contract to always provide access. Barricades, traffic signs, drums and other safety measures appropriate to the circumstances shall be provided by the Contractor to suit the specific conditions.

(f) Existing residential areas

Electricity and water supply interruptions in existing residential areas shall be kept to a minimum. The Engineer's approval shall be obtained prior to such interruptions and residents shall be notified in writing at least 24 hours but not more than 48 hours in advance. Supplies shall be normalised by 16:00 on the same day.

(g) Employment of local labour and CLO

The contractor or his appointed agent will appoint a Community Liaison Officer (CLO) after consultation with the local communities, the engineer, and the employer. The contractor shall direct all his liaison efforts with the local communities through the appointed officer. The contractor shall, however, accept the appointed as part of his management personnel.

(1) Duties of the Community Liaison Officer

The Community Liaison Officer’s duties will be:

(i) To be available on site daily between the hours of 07h00 and 17h00 and at other times as the need arises. His normal working day will extend from 07h00 in the morning until 17h00 in the afternoon.

(ii) To determine, in consultation with the contractor, the needs of the temporary labour for relevant skills training. He will be responsible for the identification of suitable trainees and will attend one of each of the training sessions if applicable.

(iii) To communicate daily with the contractor and the engineer to determine the labour requirements with regard to numbers and skill, to facilitate in labour disputes and to assist in their resolution.

(iv) To assist in and facilitate in the recruitment of suitable temporary labour and the establishment of a “labour desk”.

(v) To attend all meetings in which the community and/or labour are present or are required to be represented.

(vi) To assist in the identification, and screening of labourers from the community in accordance with the contractor’s requirements.

(vii) To inform temporary labour of their conditions of temporary employment and to inform temporary labourers as early as possible when their period of employment will be terminated.

(viii) To attend disciplinary proceedings to ensure that hearings are fair and reasonable.

(ix) To keep a daily written record of his interviews and community liaison.

(x) To attend monthly site meetings to report on labour and RDP matters in writing.

(xi) All such other duties as agreed upon between all parties concerned.

(2) Payment for the community liaison officer

A special pay item is incorporated in section 1200 of the bill of quantities relating to payment of the liaison officer on a prime cost sum basis. This payment shall only be made for the period for which the duties of the liaison officer are required and not necessarily for the full duration of the contract. The remuneration of the CLO shall be determined by the Employer with a minimum salary of **R 8,500-00** per month.

The CLO shall be paid pro rata for work done over a calendar month.

(3) Period of employment of the community liaison officer

The period of employment of the community liaison officer shall be as decided upon jointly by the contractor, engineer and employer at a maximum period of a six months basis, but with the option of renewal.

(h) Monthly statements and payment certificates

The statement to be submitted by the Contractor in terms of Clause 6.10 of the General Conditions of Contract shall be prepared by the Contractor at his own cost, strictly in accordance with the standard payment certificate prescribed by the Engineer, in digital electronic computer format. The Contractor shall, together with a copy of the digital electronic computer file of the statement, submit two (2) A4 size paper copies of the statement.

For the purposes of the Engineer's payment certificate, the Contractor shall subsequently be responsible, at his own cost, for making such adjustments to his statement as may be required by the Engineer for the purposes of accurately reflecting the actual quantities and amounts which the Engineer deems to be due and payable to the Contractor in the payment certificate.

The Contractor shall, at his own cost, make the said adjustments to the statement and return it to the Engineer within three (3) normal workings days from the date on which the Engineer communicated to the Contractor the adjustments required. The Contractor shall submit to the Engineer five (5) sets of A4 size paper copies of such adjusted statement, together with a copy of the electronic digital computer file thereof.

Any delay by the Contractor in making the said adjustments and submitting to the Engineer the requisite copies of the adjusted statement for the purposes of the Engineer's payment certificate will be added to the times allowed to the Engineer in terms of Subclause 6.10.4 of the Conditions of Contract to submit the signed payment certificate to the Employer and the Contractor. Any such delay will also be added to the period in which the Employer is required to make payment to the Contractor.

(i) Construction in restricted areas

Working space is sometimes restricted. The construction method used in these restricted areas largely depends on the Contractor's Plant. Notwithstanding, measurement and payment will be strictly according to the specified cross-sections and dimensions irrespective of the method used, and the rates and prices tendered

will be deemed to include full compensation for any difficulties encountered by the Contractor while working in restricted areas. No extra payment or any claim for payment due to these difficulties will be considered.

(j) Notices, signs, barricades, and advertisements

All notices, signs, and barricades, as well as advertisements, may be used only if approved by the Engineer. The Contractor shall be responsible for their supply, erection, maintenance, and ultimate removal and shall make provision for this in his tendered rates.

The Engineer shall have the right to instruct the Contractor to move any sign, notice or advertisement to another position, or to remove it from the site of the Works if in his opinion it is unsatisfactory, inconvenient, or dangerous.

(k) Workmanship and quality control

The onus to produce work that conforms in quality and accuracy of detail to the requirements of the Specifications and Drawings rests with the Contractor, and the Contractor shall, at his own expense, institute a quality control system and provide suitably qualified and experienced engineers, foremen, surveyors, materials technicians, other technicians and technical staff, together with all transport, instruments and equipment to ensure adequate supervision and positive control of the Works at all times.

The cost of supervision and process control, including testing carried out by the Contractor, will be deemed to be included in the rates tendered for the related items of work.

The Contractor's attention is drawn to the provisions of the various Standardized Specifications regarding the minimum frequency of testing required. The Contractor shall, at his own discretion, increase this frequency where necessary to ensure adequate control.

On completion and submission of every part of the work to the Engineer for examination and measurement, the Contractor shall furnish the Engineer with the results of the relevant tests, measurements, and levels to demonstrate the achievement of compliance with the Specifications.

C3.4.2.6 <u>Extension of time due to abnormal rainfall</u>

(a) Extension of time in respect of delays resulting from wet climatic conditions on the site will only be considered in respect of abnormally wet climatic conditions and shall be determined for each calendar month or part thereof, in accordance with the formula given below:

$$V = (Nw - Nn) + (Rw - Rn)/X$$

in which formula the symbols shall have the following meanings:

V = Potential extension of time in calendar days for the calendar month under consideration:
If V is negative and its absolute value exceeds Nn, then V shall be taken as equal to minus Nn.
When the value of V for any month exceeds the number of days in the particular month, V will be the number of days in the month.

Nw = Actual number of days in the calendar month under consideration on which a rainfall of Y mm or more was recorded on the site

Nn = Average number of days, derived from existing records of rainfall in the region of the site, on which a rainfall of Y mm or more was recorded for the calendar month

Rw = Actual rainfall in mm recorded on the site in an approved rain gauge for the calendar month under consideration

Rn = Average rainfall in mm for the calendar month, derived from existing records of rainfall in the region of the site

The factor (Nw - Nn) shall be deemed to be a fair allowance for variations from the average number of days during which the rainfall exceeds Y mm.

The factor (Rw - Rn)/X shall be deemed to be a fair allowance for variations from the average number of days during which the rainfall did not exceed Y mm but wet conditions prevented or disrupted work.

(b) The rainfall records at rainfall station Nelspruit for the period 1993 to 2017 are reproduced in the accompanying table, and the monthly averages (Rn and Nn) for this period shall, for the purposes of this Contract be taken as normal and as the values to be substituted for Rn and Nn in the formula above. The values of X and Y shall be 20 and 10 respectively.

MONTH	N_n	R_n	MONTH	N_n	R_n
January	4.7	148.8	July	0.1	7.3
February	3.4	134.0	August	0.4	9.9
March	3.5	118.1	September	0.5	17.8
April	1.5	52.0	October	1.8	61.4
May	0.5	14.8	November	4.0	117
June	0.0	4.4	December	4.2	131.9

(c) The Contractor shall, at his own cost, provide and erect on the site at a location approved by the Engineer, an approved rain gauge, which shall be fenced off in a manner which will prevent any undue interference by workmen and others. The Contractor shall, at his own cost, arrange for the reading of the rain gauge on a daily basis for the duration of the Contract. The gauge readings, as well as the date and time at which the reading was taken shall be recorded in a separate record book provided by the Contractor for this purpose.

All entries in the rainfall record books shall be signed by the person taking the reading and the gauge shall be properly emptied immediately after each reading has been taken. If required by the Engineer, the Engineer shall be entitled to witness the reading of the gauge.

(d) The Contractor's claims in terms of Subclause 5.12.1 of the Conditions of Contract for extension of time in respect of delays resulting from wet climatic conditions on the site during each month, shall be submitted in writing to the Engineer monthly; provided always that

(i) the period allowed to the Contractor in terms of Clause 10.1.1.1 of the Conditions of Contract in which to submit his claim for each month shall be reduced to seven (7) days, calculated from the last day of the month to which the claim applies; and

(ii) the 28-day period allowed to the Engineer in terms of Subclause 10.1.5 of the Conditions of Contract in which to give his ruling on the claim, shall be reduced to fourteen (14) days.

The Contractor's monthly claim shall be accompanied by a copy of the signed daily rainfall readings for the applicable month.

(e) The extent of any extension of time which may be granted to the Contractor in respect of wet climatic conditions (whether normal or abnormal) shall be determined as the algebraic sum of the "V" values for each month between the Commencement Date and the Due Completion Date of the Contract, calculated in accordance with subclause C3.4.2.6(a) above;
provided always that

(i) rainfall occurring within the period of the Contractor's Christmas shut-down period (referred to in Subclause 5.8 of the Conditions of Contract) shall not be taken into account in the calculation of the monthly "V" values;

(ii) rainfall occurring during any period during which the Contractor was delayed due to reasons other than wet climatic conditions on the site, and for which delay an extension of time is granted by the Engineer, shall not be taken into account in the calculation of the monthly "V" values;

(iii) if the algebraic sum of the "V" values for each month is negative, the time for completion will not be reduced on account of subnormal rainfall, and

(iv) where rainfall is recorded only for part of a month, the "V" value shall be calculated for that part of the month using pro rata values for Nn and Rn.

(f) The Engineer shall, simultaneous with granting any extension of time in terms of this clause, revise the Due Completion Date of the Contract to reflect an extension of time having been granted in respect of wet climatic conditions, to the extent of the algebraic sum of all the "V" values for all the preceding months of the Contract, less the aggregate of the "Nn" values for the remaining (unexpired) months of the Contract (viz less aggregate of the potential maximum negative "V" values for the remaining Contract Period). Thus, provided that where such period is negative, the Due Completion Date shall not be revised.

(g) Any extension of time in respect of wet climatic conditions granted in terms of this clause shall not be deemed to consider delays experienced by the Contractor in repairing or reinstating damage to or physical loss of the Works arising from the occurrence of abnormal climatic conditions. Extension of time in respect of any such repairs or reinstatement regarding damage shall be the subject of a separate application for extension of time in accordance with the provisions of Clause 5.12 and Clause 10 of the Conditions of Contract.

C3.4.3 PLANT AND MATERIALS

C3.4.3.1 Plant and materials supplied by the employer

Not applicable.

C3.4.3.2 Materials, samples and shop drawings

(a) Samples

Materials or work which does not conform to the approved samples submitted in terms of Subclause 7.4 of the General Conditions of Contract will be rejected. The Engineer reserves the right to submit samples to tests to ensure that the material represented by the sample meets the specification requirements.

The costs of any such tests conducted by or on behalf of the Engineer, the results of which indicate that the samples provided by the Contractor do not conform to the requirements of the Contract, shall, in accordance with the provisions of Subclause 7.4.4 of the General Conditions of Contract, be for the Contractor's account.

C3.4.4 CONSTRUCTION EQUIPMENT

C3.4.4.1 Requirements for equipment

Equipment to be utilised must be such that the work can be executed in an efficient manner. Old plant which leaks hydraulic fluid and have breakages shall be removed from site and replaced with proper plant.

C3.4.4.2 Equipment provided by the employer

No equipment will be provided by the Employer.

C3.4.5 EXISTING SERVICES

C3.4.5.1 Known services

All known services are indicated on the drawings. The onus rests on the Contractor to locate the known services before any construction commences.

C3.4.5.2 Treatment of existing services

Existing services shall be relocated or removed as indicated on the drawings only at the instruction of the Engineer.

C3.4.5.3 Use of detection equipment for the location of underground services

The Contractor shall utilise whatever necessary equipment to locate underground services. No extra payment will be done for this, except for items listed in the Bill of Quantities.

C3.4.5.4 Damage to services

Damage that occurs to unknown services during construction will be paid by the Employer through contingencies.

However, all services that have been located and exposed, and are subsequently damaged by the Contractor or his subcontractor, shall be reinstated to the same state as it was before the damage occurred at the time and cost of the Contractor.

C3.4.5.5 Reinstatement of services and structures damaged during construction

The Contractor shall inform the Engineer immediately when a service or structure is damaged. The extent of the damage and a proposal how to reinstate the service or structure shall be submitted to the Engineer on a sketch with dimensions and time frames.

The Contractor shall not be allowed to reinstate any service or structure unless indicated so by the Engineer. The Contractor shall inform and render all reasonable assistance to the service or structure owner with the reinstatement of the service or the structure if required.

The Contractor shall be liable to reinstate the service or structure to its original state before damage occurred.

C3.4.6 VARIATIONS AND ADDITIONS TO SANS 1200 STANDARDIZED SPECIFICATIONS AND PARTICULAR SPECIFICATIONS (if applicable)

In certain clauses, the Standardized Specifications allow a choice to be specified in the Specification Data between alternative material or methods of construction, and for additional requirements to be specified to suit a particular contract. Details of such alternatives or additional requirements applicable to this contract are contained in this part of the Specification Data. It also contains such additional specifications as are required for this particular contract.

The number of each clause and each payment item in this part of the project specifications consists of the prefix “PS” followed by a number corresponding to the number of the relevant clause or payment item in the Standardized Specifications. New clauses and payment items not covered by clauses or payment items in the Standardized Specifications if included here are also designated “PS”, followed by a number. The new numbers follow on the last clause or item number used in the relevant section of the Standardized Specifications.

SECTION 2 : PROJECT SPECIFICATION

SANS 1200 A : GENERAL

A 3 MATERIALS

PS A 3.1 QUALITY

Substitute the second sentence of the first paragraph of A 3.1 with the following:

Materials shall bear the official mark of the appropriate standard.

Substitute the second paragraph with the following:

Samples, on which control the Engineer requires testing, shall be delivered free of charge to a recognised commercial laboratory. The Contractor is responsible for the cost of all testing to ascertain that the materials do comply with the relevant minimum requirements and all such costs shall be deemed to be included in the tendered rates. The cost of control tests done by the Engineer and of which the results do not comply with the minimum requirements shall be for the Contractor's account.

The Contractor shall inform the Engineer of any control testing to be done at least 48 hours before such tests are required and must allow in his program for the time necessary for the tests and the processing of the results thereof.

A 5 CONSTRUCTION

A 5.1 SURVEY

PS A 5.1.1 Setting Out of the Works

Substitute the first sentence in A 5.1.1 with the following:

Setting out of the works is the sole responsibility of the Contractor and shall be done from survey pegs and from benchmarks where applicable. Otherwise existing stand boundaries will be used as reference. The Contractor shall, within two weeks after the site has been handed over to him, ascertain himself of the correctness of all pegs and benchmarks. Any discrepancy shall immediately be reported in writing to the Engineer. Any costs or subsequent costs arising from discrepancies, which had not been reported to the Engineer within the aforementioned period, shall be the sole responsibility of the Contractor.

No extra compensation will be applicable for the setting out of the works. It will be deemed covered by other tendered rates.

PS A 5.2 WATCHING, BARRICADING, LIGHTING AND TRAFFIC CROSSINGS

Add the following to A 5.2:

The crossing of existing streets with services must be done in half widths.

Road traffic signs shall comply with the requirements of the "South African Road Traffic Signs Manual" and shall be approved by the Engineer before construction commences.

PS A 5.9 **COMMUNITY LIAISON OFFICER**

The Contractor in consultation with the PSC and the Local Municipality shall appoint a Community Liaison Officer. His/her role will be to liaise between the contractor, labourers, community, and PSC. The contractor will pay his remuneration and a provisional sum has been provided for this expenditure. The CLO will assist with the recruitment of labour, based on recommendations by the PSC. The CLO must submit a written report about the status of the project at every site meeting. It is the responsibility of the contractor to ensure that the CLO attends site meetings and submit a report in writing.

A 7 **TESTING**

PS A 7.2 **APPROVED LABORATORIES**

Substitute A 7.2 with the following:

Only laboratories that are SANAS accredited (civils, materials, testing laboratories) shall be regarded 'approved'.

PS A 7.4 **STATISTICAL ANALYSIS OF CONTROL TESTS**

Substitute A 7.4 with the following:

Test results shall not be evaluated by statistical methods. All results shall comply with the specified minimum requirements as specified in the relevant SANS standards.

A 8 **MEASUREMENT AND PAYMENT**

A 8.2 **PAYMENT**

PS A 8.2.5 **Adjusted Payment for Time-Related Items**

The payment to the Contractor for time-related items shall be adjusted in accordance with the following formula in the event of the contract being extended by means of a variation order:

$$\text{Sum of Tendered amounts for time-related items} \times \frac{\text{Extended contract period as authorised by variation order}}{\text{Tendered contract period}}$$

The above-mentioned adjustment of the payment for time-related items shall be made in the Completion Payment Certificate and shall be the only payment for additional time-related costs.

PS A 8.3.1 **Contractual Requirements**

Add the following paragraph:

"The tendered amount shall be paid pro-rata per year during the implementation of the multi-year project. The portion payable for the first year shall not be escalated. The second and subsequent years shall be escalated."

PS A 8.4.1 **Contractual Requirements**

Add the following paragraph:

"The tendered amount shall be paid pro-rata per year during the implementation of the multi-year project. The portion payable for the first year shall not be escalated. The second and subsequent years shall be escalated.

PS A 8.5 **Sum stated provisionally by Engineer**

1)	**Community Liaison Officer**	**Unit : Prov Sum**
2)	**Social Facilitator – nominated**	**Unit : Prov Sum**
3)	**Environmental Control Officer – nominated**	**Unit : Prov Sum**
4)	**OHS Agent – nominated**	**Unit : Prov Sum**
5)	**New Package Plant Building – local subcontractor**	**Unit : Prov Sum**
6)	**Paving of WTPP yard – local subcontractor**	**Unit : Prov Sum**
7)	**New "ClearVu" security fence – local subcontractor**	**Unit : Prov Sum**
8)	**Geophysical Investigation and borehole supervision**	**Unit : Proc Sum**
9)	**Eskom Power supply**	**Unit : Prov Sum**
10)	**Overheads, charges and profit on items 1 to 9**	**Unit : %**

The provisional sums will be dealt with as per Clause 6.6 of the GCC. The onus to do direct payments to subcontractors for work done under this item, rests solely with the Employer.

PS A 8.7 **DAYWORK**

Add the following daywork items:

a) Labour

i) un-skilled …….……..…….. Unit : hr

ii) semi-skilled …….……..…….. Unit : hr

iii) skilled …….……..…….. Unit : hr

iv) foreman …….…….. Unit : hr

b) Plant

i) 5 ton tipper truck with operator …….. Unit : hr

ii) 0.5 m³ excavator with operator …… Unit : hr

iii) 5000ℓ water truck with operator …… Unit : hr

iv) Bomag BW 90 compactor with operator …….. Unit : hr

The unit cost will make, in addition to the standard specifications, provision for the cost of the machine, the fuel and the operator, inclusive of all costs except VAT.

SECTION 2 : PROJECT SPECIFICATION

SANS 1200 AB : ENGINEER'S OFFICE

AB 3 **MATERIALS**

PS AB 3.1 **NAME BOARDS**

Substitute "South African Institution of Civil Engineers" in the first paragraph of AB 3.1 with "South African Association of Consulting Engineers".

PS AB 3.2 **OFFICE BUILDINGS**

Office building(s) are not required for the Engineer.

AB 5 **CONSTRUCTION**

PS AB 5.1 **NAME BOARDS**

Add the following to AB 5.1:

The name boards shall be erected within a month of the commencement date of the contract and shall be placed at the position indicated by the Engineer. Any damage to these boards shall be repaired within fourteen days of a written instruction issued by the Engineer. The Contractor will be permitted to erect a maximum of two of his own name boards, in positions approved by the Engineer. The Engineer reserves the right to order the removal of these boards if they are not kept in good repair.

SECTION 2 : PROJECT SPECIFICATION

SANS 1200 C : SITE CLEARANCE

C 3 MATERIAL

PS C 3.1 DISPOSAL OF MATERIAL

Substitute the first sentence of C 3.1 with the following:

Material obtained from clearing and grubbing, and demolition of structures shall be disposed of at the site indicated during the site clarification meeting.

C 5 CONSTRUCTION

PS C 5.1 AREAS TO BE CLEARED AND GRUBBED

Substitute the first sentence of C 5.1 with the following:

The Engineer will indicate to the Contractor, which areas need to be cleared and grubbed. The Contractor may proceed with clearing and grubbing of pipe routes limited to a 3 m wide strip only after the Engineer has indicated the above-mentioned routes. Measurement and payment for clearing and grubbing shall only occur for areas as instructed in writing by the Engineer.

Substitute the last paragraph with the following:

The Contractor shall program his work in such a manner that re-clearing will not be necessary. The cost of re-clearing shall be borne by the Contractor.

C 5.2 CUTTING OF TREES

C 5.2.3 Preservation of Trees

PS C 5.2.3.2 Individual trees

Add the following to C 5.2.3.2:

Trees outside street, channel and pipeline routes must be left standing and undamaged, except where otherwise ordered in writing by the Engineer.

A penalty of R 5,000-00 per tree for trees damaged and/or removed will be charged.

PS C 5.9 EXISTING FENCING

The existing fences must be repaired to its original state immediately after damage to it has occurred. No additional payment will be applicable for repair work.

SECTION 2 : PROJECT SPECIFICATION

SANS 1200 D & DB : EARTHWORKS & EARTHWORKS (PIPE TRENCHES)

D 3 MATERIALS

D 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PS D 3.1.1 Method of classifying

Material will only be classified as “Soft Excavation” and “Hard Rock Excavation” as defined in Clause 3.1.2 of 1200 D.

‘Soft’ and ‘Intermediate’ excavation shall be classified as “Soft Excavation”. ‘Hard Rock’ excavation, ‘Boulder excavation Class A’ and ‘Boulder excavation Class B’ shall be classified as “Hard Rock Excavation”.

D 3.3 SELECTION

PS D 3.3.1 General

Replace the second paragraph with the following:

The Contractor must be selective in all excavations for pipe trenches in order to ensure that all suitable material will not be contaminated by unsuitable material. No extra payment will be made in this regard and all costs incurred in this way will be considered to be included in the rate for the relevant item. If contamination of suitable material does occur the contractor will be expected to remove the contaminated material and supply material of at least the same quality as the in situ suitable material at his own time and expense.

PS DB 3.5 BACKFILL MATERIALS

Add the following to DB 3.5(b):

c) All pipe trenches crossing street reserves shall be classified as areas subject to loads from road traffic.

DB 4 PLANT

PS DB 4.1 EXCAVATION EQUIPMENT

Add the following to DB 4.1:

All excavations exceeding the specified widths shall be backfilled with approved selected material. No payment shall be made for this and all relevant costs shall be deemed to be included in the tendered rates.

DB 5 CONSTRUCTION

PS DB 5.1.2 Storm Water, Seepage and De-watering of Excavations

The cost of dealing with any water shall deem to be included in the tendered rates for excavation and no additional payment will be made in this respect.

PS DB 5.2 MINIMUM BASE WIDTHS SPECIFIED

Substitute paragraph (b) of DB 5.2 with the following:

The minimum base width for all pipes with a diameter of 300 mm or less shall be 600 mm plus the outside diameter of the pipe, irrespective of the depth at which they are laid, except for house water connections where the paid base width shall be 400 mm.

Bedding is required for all pipes with a diameter greater than 50 mm.

PS DB 5.4 **EXCAVATION**

Add the following to DB 5.4:

Excavation and backfilling of pipe trenches on sidewalks in the residential area shall be done in such a way as to ensure the least possible disruption to the public and entrances to properties. No additional payment shall be made for this and all relevant costs shall be deemed to be included in the tendered rates.

No open trenches longer than 100 meters at a time will be allowed. As the trenches are dug, bedding must be done, and the pipes must be laid in a continuous manner.

PS DB 5.5 **TRENCH BOTTOM**

Substitute “90 %” in the second paragraph of DB 5.5 with “93 % (100 % for sand)”.

DB 5.7 **COMPACTION**

PS DB 5.7.2 **Areas subject to traffic loads**

Add the following to DB 5.7.2:

All pipe trenches that cross a street reserve will be regarded as areas subject to traffic loads.

Sand backfilling shall be compacted to 100 % of MOD AASHTO density.

DB 5.9 **REINSTATEMENT OF SURFACE**

PS DB 5.9.2 **Private property and commonage**

Add the following to DB 5.9.2:

Gardens and lawns shall be repaired to the original standard where they were crossed. Grass and plants shall be taken out of the ground, temporarily planted, watered during construction and replanted after backfilling. No additional payment will be done for these actions and shall be deemed included in other rates.

DB 8 **MEASUREMENT AND PAYMENT**

DB 8.3 **SCHEDULED ITEMS**

PS DB 8.3.5 **Existing services that intersect or adjoins a pipe trench**

PS DB 8.3.5(a) **Services that intersect a trench …… Unit : No**

Add the following to DB 8.3.5(a):

Existing services with a depth of cover exceeding 300 mm, measured from the bottom of excavation to the top of the existing service shall not be measured and paid for. There will be distinguished between existing trunk services and existing stand connections.

The rate shall also allow for the following costs:

i) Sufficient photos have to be taken of existing services and handed over to the Engineer before they are being crossed, if there is a possibility of a difference in opinion over the condition of those services, especially on private property.

ii) If such a service is damaged, it has to be repaired to its original condition or if possible, to a standard agreed to in writing with the relevant owner. This agreement has to be approved by the Engineer.

iii) If such a service is removed, it has to be replaced as per original.

PS DB 8.3.5(b) **Services that adjoin a trench …….…….…….…… Unit : m**

Add the following to DB 8.3.5 (b):

The unit "number" will only be used for services such as poles and trees.

The cost for shoring shall be deemed as covered by the listed items and no additional payment will be made for this.

No payment will be made for overhead services that do not rest directly on the ground except where allowance is made for this in the schedule of quantities.

Existing services that rest directly on the ground e.g. poles, trees, walls and structures are handled in the same way as underground services, but the axis of the service will be determined as follows:

The vertical axis is defined as the nearest side or corner of the existing structure to the excavation, measured at the point where the structure and natural ground level intersect.

The horizontal axis will be at the point where the structure and the natural ground level intersect. In this instance, where the excavation falls above the 45° line below the horizontal axis, but within 1,0 meter horizontally from the structure, the service will also be measured as adjoining.

If the structure, according to the above-mentioned, does not qualify as an adjoining service but the foundation of the structure is such that if a 45° line drawn from the nearest bottom corner thereof cuts through the excavation, the structure will be measured as an adjoining service **if approved by the Engineer**.

If there is more than one service adjoining the same trench and such a service is on the same side of the trench, payment will only be made for the nearest service to the trench, or if they are the same distance from the trench for the top one. The maximum number of services that will be paid for, is therefore one on each side.

There will be distinguished between existing trunk services and existing stand connections.

DB 8.3.6 **Finishing**

Add the following:

"PS DB 8.3.6.1 **Reinstate road surfaces complete with all courses**

a) Gravel causeway street ……..……..…….. m²

b) 80mm paving bricks ……..……. m³

PS DB 8.3.7 **Accommodation of Traffic in Village ……..…… Sum**

All the costs for the accommodation of traffic in the Village for the duration of the project shall be covered under this item."

SECTION 2 : PROJECT SPECIFICATION

SANS 1200 L : MEDIUM PRESSURE PIPELINES

L 3 MATERIAL

PS L 3.1 GENERAL

Substitute the first sentence of L 3.1 with the following:

"Types and classes of pipes shall be as scheduled."

Add the following:

"PS L 3.7.3 STAINLESS STEEL PIPES

PS L 3.7.3.1 General

Stainless steel pipes shall be plain ended or flanged, as shown on the drawings. Pipe wall thicknesses shall comply with ASTM Schedule 105 and flanges shall comply with SANS 1123, Table 1600/3.

PS L 3.7.3.2 Grade and welding procedure

The grade of stainless steel shall be 316L.

Welding procedure shall be only those recommended by the stainless steel manufacturer or by the South African Institute of Welding. Written confirmation that welding has been carried out by welders coded to ASME IX, 1995, shall be provided prior to manufacturing.

Welds shall be smooth and free from blowholes, undercuts, sharp projections and similar visual defects.

Stainless steel fabrications shall be carried out in a clean working place where there is no contamination by mild steel. Grinding and polishing equipment shall be dedicated and shall not be contaminated with other metals.

Stainless steel shall be handled in such a way as to avoid scratching of the surface.

PS L 3.7.3.3 Pickling and passivation

Cut edges, welds end heat affected surfaces shall be pickled and passivated to remove all discolorations, lickling and passivating pastes shall be used as prescribed by the manufacturer.

Care shall be taken not to exceed the maximum contact time recommended. No heat discolouration shall remain after pickling and passivation. After passivation, surfaces shall be thoroughly washed to remove all traces of acid."

PS L 3.8 JOINTING MATERIALS

PS L 3.8.3 Flanges and accessories

Add the following to L 3.8.3:

"Flanges shall be drilled to SANS 1123 Table 1600/3.

Bolts, nuts and washers shall comply with PS L 3.9.5"

PS L 3.8.4 **Loose Flanges**

Substitute the first sentence of the last paragraph of L 3.8.4 with the following:

"Bolts and nuts shall comply with the requirements of SANS 135."

PS L 3.9 **CORROSION PROTECTION**

PS L 3.9.5 **Joints, Bolts, Nuts and Washers**

Substitute L 3.9.5 with the following:

"All joints, bolts, nuts, and washers shall be stainless steel. Stainless steel bolts used on mild steel pipes and fittings shall be provided with nylon sleeves and felt washers to prevent contact between the stainless steel and the mild steel."

PS L 3.10 **VALVES**

Detail technical information of all valves must be submitted to the Engineer for approval before ordering.

PS L 3.10.1 **Gate/Scour Valves**

All gate/scour valves must be cast iron AVK valves in accordance with SANS 664 and SANS 665 and fittings in accordance with JASWIC R18-1986 or similar and of the water works type suitable for a working pressure of 1,6 MPa. All gate/scour valves must be able to open and close against a differential pressure equal to work pressure.

Gate/scour valves shall be as shown on the drawings and shall open anti-clockwise. The direction for opening and closing shall be permanently displayed on the valves. Valves shall have non-rising spindles.

Pipes shall not be testes against a closed valve. Thrust blocks for test sections shall be approved by the Engineer prior to testing of pipes.

PS L 3.10.2 **Fire Hydrants**

Fire hydrant steel pipes shall be manufactured of SANS 62, heavy-duty pipe. All joints shall be flanged to SANS 1123 Table 1600/3, except where Viking Johnson couplings are shown on the drawings. The pipework shall include all pipes, joints, valves, hydrant tee, fittings and the Pretoria type vandalism proof hydrant.

Hydrant installations shall be supplied with all the fittings and pre-cast concrete support stand complete as shown on the drawings.

PS L 3.10.3 **Butterfly Valves**

Butterfly valves shall be fully flanged.

The valves shall be fitted with gearboxes with stainless steel shafts. The body shall be clad with rubber.

Butterfly valves shall be similar and equal to the "compact" type with a working pressure of 1,0 MPa.

Flanges shall be drilled according to SANS 1123 Table 1600/3.

PS L 3.10.4 **Air Valves**

Air valves shall be of the “Vent-O-Mat RBX”- type and shall be able to withstand pressures of up to 1,6 or 2,5 MPa whichever is applicable.

The valves shall vary between 25 mm to 50 mm diam.

PS L 3.10.5 **Electromagnetic Flow Meter**

The meter shall be a 100- and 250-mm diameter flanged meter with the following features:

a) stainless steel flow tube,
b) obstruction less bore,
c) automatic zero and span stability,
d) no need for electrode cleaning,
e) sensor removable with pipe under pressure,
f) grounding ring,
g) remote converter in control room.

The meter shall be able to read a min flow of 10 ℓ/s and a max flow of 100 ℓ/s.

L 4 **PLANT**

L 4.1 **HANDLING AND RIGGING**

Add the following:

PS L 4.1.1 **Transportation**

Pipes and valves shall be protected during transportation and handling against damages caused by impact, dropping, etc. Special care shall be taken during transportation to protect pipes and valves. All pipes and valves shall be inspected for defects immediately before laying and faulty pipes/valves or pipes/valves that have suffered damage, which would affect their serviceability, shall not be used in the Works.

PS L 4.1.2 **Off-loading and storage**

Pipes/valves which cannot be off-loaded by hand shall only be lifted by means of suitably approved broad band slings. The use of wire, chains, hooks, crowbars and similar items shall not be permitted, and the pipes, fittings and specials shall not be handled in such a manner as could cause damage to occur.

Pipes, fittings, and specials shall at no time be laid, stacked or rolled directly into the ground but shall be supported on suitable padded cradles or other approved material near each end of the pipe, fittings or special. Care shall be taken where pipes with fitted couplings are handled or stacked to prevent any pressure on the couplings.

All pipe work as well as the rubber sealing rings in pipe couplings shall be protected from the elements to prevent deterioration of the pipe work.

No concessions will be made in the above regard and failure on the Contractor's part to comply shall be considered just cause for the Engineer to order such part of the works to be closed down.

Where the pipes are to be stored on site it is essential that the storage are be as level as possible and cleaned of any object that may cause damage to the pipes. When a load of pipes arrives ensure that a representative of the manufacturer is present to supervise the off-loading.

PS L 4.1.3 **Inspection on delivery**

The Engineer will thoroughly inspect all pipes, fittings and specials delivered to the site but his acceptance of same as being in good condition shall not relieve the Contractor of any of his obligations or responsibilities under this Contract.

Materials rejected by the Engineer shall be removed from the site and shall be replaced by other approved materials by the Contractor at his own expense.

PS L 4.2 **SETTING OUT**

Add the following:

Alignment of the pipes may be done either by means of infra-red sighting equipment or by sight rails. The following method should be followed if alignment is to be done by sight rails:

Prior to the preparation of the pipe bedding, the Contractor is to erect sight rails of 38 mm x 150 mm timber at intervals of a maximum of 60 m or at points of change of pipe gradient, whichever may be the lesser. These shall be supported by wooden posts on each side firmly fixed on solid ground and the rails shall be accurately placed in position as regards alignment and invert level of the proposed trench. The centre line of the trench (i.e. pipeline) shall be denoted on each sight rail, both back and front by a single vertical line drawn thereon, and the rail on either side of the centre line painted in two contrasting colours.

The Contractor shall also provide boning rods of an appropriate length marked in even centimetres for use in the fixing of the trench bottom to the correct line and level.

PS L 4.3 **TESTING**

Add the following to L 4.3

The Contractor must ensure that the test equipment is in good order and that it is calibrated.

L 5 **CONSTRUCTION**

L 5.1 **LAYING**

L 5.1.1 **GENERAL**

The supplier will provide the contractor with an induction course on good practice for the installation and testing of the pipes. The consultant will inspect the coarse outcome for approval. The final responsibility of the quality of installation lies with the client.

PS L 5.1.4 **Depths and Cover**

PS L 5.1.4.1 **Cover**

The minimum cover to the soffit of pipes is 900 mm and 1500 mm when a street is crossed.

L 5.6 **VALVE AND HYDRANT CHAMBERS**

PS L 5.6.1 **General**

Substitute the first sentence of L 5.6.1 with the following:

The drawings of valve and hydrant chambers, which are in the document containing drawings, shall supersede the corresponding drawings in the standard specification.

L 5.5 **ANCHOR/THRUST BLOCKS**

Measurement for anchor blocks will be determined on site by the Engineer after each position has been inspected and shall be according to the drawings.

PS L 7 **TESTING**

PS L 7.3 **STANDARD HYDRAULIC PIPE TEST**

PS L 7.3.1 **Test pressures and time of test**

Add the following to L 7.3.1.1:

Pipes shall not be tested against isolating valves. Special blank flanges or end caps, fully anchored, shall be provided for testing.

Substitute L 7.3.1.2 with the following:

The test pressure for field testing shall be 1, 5 times the rated maximum working pressure of the pipe.

Substitute L 7.3.1.3 with the following:

The test pressure applied according to L 7.3.1.2, must, with allowance for any level differences along the pipeline, be such that the pressure at any point in the pipeline will be at least 1,25 times and not more than 1,5 times the rated working pressure of the pipe.

PS L 8 **MEASUREMENT AND PAYMENT**

PS L 8.2 **SCHEDULED ITEMS**

PS L 8.2.3 **Extra-over 8.2.1 for the supplying, fixing and bedding of Class 16 flanged AVK Gate Valves (spigot and socketed type)**

i. 90mm dia flanged Class 16 AVK RSV gate valve…… Unit : No

Add the following to L 8.2.3:

Valves are measured and paid for per item, complete with the inclusion of the cutting of pipes, couplings, extra excavation and all extra material and labour that is required, including tees, fittings, isolating valves (e.g. under air valves), complete as shown on the drawings, for installation on new and/or existing pipes.

PS L 8.2.11 **Anchor/thrust blocks and pedestals …….. Unit : m^3**

Anchor and thrust blocks shall be measured per cubic metre concrete and the tendered rate shall include for all formwork and reinforcement (where specified) for the required dimensions indicated on the drawings.

PS L 8.2.13 **Supply and install pre-cast lockable valve boxes (Salberg or similar) Unit :No**

Pre-cast lockable valve boxes will be measured in number.

PS L 8.2.17 **Pipe markers …… Unit: No**

Pipes routes must be marked at least every hundred meters. The pipe marker must be manufactured and installed as per issued drawing. The tendered rate will include the manufacture/supply, labour, installation and punching in of detail on metal plate to the satisfaction of the engineer.

PS L 8.2.18 **Supply all material and install communal pillar tap complete as per Drawing - Typical Water Detail …….. Unit: No**

Pillar taps are measured and paid for per item, complete with the inclusion of the cutting of pipes, couplings, extra excavation and all extra material and labour that is required, including tees, fittings, isolating valves, complete as shown on the drawings.

SECTION 2 : PROJECT SPECIFICATION

SANS 1200 LB : BEDDING (PIPES)

LB 3 **MATERIALS**

PS LB 3.1 **SELECTED GRANULAR MATERIAL**

Substitute LB 3.1 with the following:

Selected granular material shall be an aggregate, sand or granular material, all of a non-cohesive nature and free from any organic material, of which the grading analysis shows 100% passing a 13,2 mm sieve and not more than 5% passing a 0,075 mm sieve.

PS LB 3.2 **SELECTED FILL MATERIAL**

Substitute LB 3.2 with the following:

The requirements of PS LB 3.1 shall apply mutatis mutandis.

PS LB 3.3 **BEDDING**

Add the following to LB 3.3:

All pipes shall be classified as rigid pipes and shall be laid on a Class C bedding except house/yard connections, which shall be classified as flexible pipes.

LB 5 **CONSTRUCTION**

LB 5.1 **GENERAL**

PS LB 5.1.4 **Compacting**

Substitute “90 % of MOD AASHTO” in LB 5.1.4 with “93 % of MOD AASHTO (100 % for sand)”.

LB 8 **MEASUREMENT AND PAYMENT**

LB 8.1 **PRINCIPLES**

PS LB 8.1.1 **Supply of bedding materials measured separately**

Add the following to LB 8.1.1.

Payment for bedding material and selected fill material shall only be made if the selected trench-excavation material cannot be used in the same position as bedding material but has to be obtained from another part of the site of works or designated borrow pits, or from commercial sources.

PS LB 8.1.4 **Separate items for cradle and blanket**

Substitute LB 8.1.4 with the following:

No distinction shall be made between material for the bedding cradle and selected fill blanket, and the material shall comply with the requirements for material for bedding cradle.

PS LB 8.1.5 **Disposal of displaced material**

Substitute LB 8.1.5 with the following:

Surplus displaced material shall be evenly spread over the trench to form the shape of a rounded berm. Cross berms will be constructed every 20 meters with the surplus material where the trench is on a slope steeper than 4%. Rocks and stones larger than 50 mm in diameter must be spoiled at a designated site as indicated by the Engineer. No overhaul will be payable. No extra payment will be applicable to this action and it will be deemed included in other rates.

SECTION 3: PROJECT SPECIFICATION

PB : BUILDING WORK (SANS 10400)

PB 1.0 SCOPE

This section specifies the general requirements for the construction of buildings.

PB 2.0 INTERPRETATIONS

PB 2.1 SUPPORTING SPECIFICATIONS

(a) SANS 10400 – National Building Regulations;

(b) SANS 1200 A or SANS 1200 AA as applicable;

(c) SANS 1200 C;

(d) SANS 1200 D or SANS 1200 DA as applicable;

(e) SANS 1200 G or SANS 1200 GA or SANS 1200 GB as applicable.

PB 2.2 GENERAL

Building work shall be carried out in accordance with the National Building Regulations and Building Standards Act, 1977, and these specifications.

References to specifications and codes of practice of the South African Bureau of Standards shall be taken to be references to the latest edition of such specifications and codes of practice as amended. Where possible the SANS mark shall appear on all articles, materials or items where it is required to comply with such SANS specification.

PB 2.3 COMMERCIAL PRODUCTS

In all instances where the Contractor handles, stores, uses, applies or fixes commercial products, the work shall be strictly carried out according to the instructions of the manufacturer of such products.

PB 2.4 SAMPLES

The Contractor shall furnish without delay, such samples as called for or may be called for by the Engineer. Materials or workmanship not corresponding with approved samples, may be rejected by the Engineer and shall be removed from the works at the cost of the Contractor.

PB 3.0 MATERIALS

PB 3.1 CEMENT

Cement for masonry work shall comply with the requirements of SANS ENV 431-1 and cement for concrete work shall be CEM I Portland cement or CEM III blast-furnace cement complying with the requirements of SANS ENV 197-1.

Separate storage facilities shall be provided for the various types of cement.

PB 3.2 WATER

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

PB 3.3 LIME

Lime shall be hydrated bedding mortar lime complying with the requirements of SANS 523.

PB 3.4 AGGREGATE

Sand for plaster and mortar shall comply with the requirements of SANS 1090, whereas the aggregates for normal and granolithic floor creeds shall comply with the requirements of BS1199 and BS1201 respectively.

PB 3.5 BURNT CLAY BRICKS

Burnt clay bricks shall comply with the requirements of SANS 227 and shall also be equal in all respects to the three samples of each type of brick furnished by the Contractor prior to commencement of the works and as approved by the Engineer.

General purpose (special) bricks shall be used in foundation walls and lintels.

The colour and texture of face bricks shall be as specified in the project specifications. Care shall be taken to avoid damage to arisses and faces during transport and handling.

Fire bricks shall be of well burnt refractory fire clay, resistant to spalling and cracking and of same size as the ordinary bricks.

PB 3.6 CONCRETE MASONRY UNITS

Pre-cast concrete masonry units shall comply with the requirements of SANS 1215 and shall be solid unless specified otherwise in the project specifications.

PB 3.7 CALCIUM SILICATE MASONRY UNITS

Calcium silicate masonry units shall comply with the requirements of SANS 285.

PB 3.8 WALL TIES

Wall ties shall comply with the requirements of SANS 28.

PB 3.9 AIR BRICKS

Air bricks shall be well-burnt terra-cotta air bricks in external faces of walls and 250 mm x 150 mm rectangular gypsum air bricks covered with copper mosquito gauze in internal faces.

PB 3.10 BRICK REINFORCEMENT

Brick reinforcement shall be hard drawn mild steel comprising two 3,15 mm diameter wires spaced 75 mm apart and 2,8 mm diameter cross wires spaced at not exceeding 300 mm apart welded to main wires.

PB 3.11 QUARRY TILES

Quarry tiles shall be of approved quality, even in thickness, truly square, free from cracks, twists and blemishes and uniform in colour and unless otherwise specified, shall be of approved red colour.

PB 3.12 CERAMIC TILES

Glazed ceramic tiles for walls shall comply with the requirements of SANS 22 and, unless otherwise specified, shall be white, size 150 mm x 150 mm x 6,5 mm thick.

Ceramic tiles for floors shall comply with the requirements of SANS 1449 and, unless otherwise specified, shall be unglazed, size 240 mm x 115 mm x 20 mm **thick and of approved colour.**

PB 3.13 CONCRETE PAVING SLABS

Concrete paving slabs shall be precast units of grade 25 MPa/13 mm concrete and shall be of approved manufacture, at least 50 mm thick and sizes 250 mm x 250 mm minimum and 600 mm x 600 mm maximum.

Concrete slabs shall be even in thickness, truly square, free from cracks, twists and blemishes, with a uniform natural cement colour and surface finished smoothly in the mould and shall also be equal in all respects to the samples furnished by the Contractor prior to commencement of the works and as approved by the Engineer.

PB 3.14 DAMP-PROOF MEMBRANE

Damp-proof membrane under floors, unless otherwise specified, shall be of polyethylene sheeting complying with the requirements of SANS 952 as Type C-plain surfaces specified therein, 250 microns in dry areas and 375 microns in wet areas.

PB 3.15 DAMP-PROOF COURSE IN WALLS

Horizontal and vertical damp-proof course, unless otherwise specified, shall be of bituminous sheeting complying with the requirements of SANS 248 and as Type FV (Fibre Base) sheeting or as Type GH (Hessian Base) sheeting specified therein, or of polyethylene sheeting complying with the requirements of SANS 952 and as Type A-plain surfaces 450 microns or as Type B-embossed surfaces 375 microns as described therein.

PB 3.16 TREATMENT OF TIMBER

All timber shall be given a preservative treatment suitable for the duty for which the timber is intended in accordance with SANS code of practice 05, and no untreated timber shall be used. The preservative treatment shall not impair the final finish. The timber shall be impregnated throughout. When surface coating is specified, the compounds applied on the surfaces of the timber shall form an unbroken film.

PB 3.17 STRUCTURAL TIMBER

Structural timber, unless otherwise specified, shall be of South African softwood (pine) complying with the requirements of SANS 563 or SANS 1245 and, unless otherwise specified or shown on the drawings, shall be of Grade 4 and shall be marked as laid down in the specification.

Roof battens and other structural timbers not less than 50 mm or more than 65 mm in width and not less than 38 mm or more than 50 mm thickness, shall be of South African softwood (pine) complying with the requirements of SANS 653.

All structural timber shall bear the full standardisation mark of the South African Bureau of Standards.

The tolerance by which "actual" dimensions may vary from the "nominal" dimensions specified or stated on drawings of South African sawn structural softwood, shall be as laid down in SANS 563, SANS 653 and SANS 1245 where relevant.

PB 3.18 STRUCTURAL LAMINATED TIMBER

(a) Stock glued laminated timber of S.A. pine

Stock glued laminated timber of S.A. pine shall comply with the requirements of SANS 1089 and shall be marked as laid down in the specification and shall also bear the standardisation mark of the SANS.

(b) Designed glued laminated timber

Structural glued laminated timber shall comply with the requirements of SANS 876 and shall be marked as laid down in the specification and shall also bear the standardisation mark of the SANS.

The timber shall be of -

(i) softwood or hardwood;

(ii) the density group and grade;

(iii) the exposure category;

(iv) moisture content; and

(v) of Class A or Class B appearance;

as specified and, in services having timbers treated against infestation by insect pests, shall be treated against pests as laid down in the specification for laminated timber.

PB 3.19 GALVANISED STEEL ROOFING SHEETS

Galvanised steel roofing sheets shall be of the profile as scheduled or shown on the drawings, of 0,60 mm thick mild steel (before galvanising) and shall be galvanised on both sides to the requirements of SANS 934 for a Class Z250 coating, unless a Class Z600 coating is specified, and shall be passivated.

PB 3.20 METAL RIDGING FOR STEEL COVERED ROOFS

Galvanised iron ridging for ridges and hips of steel covered roofs shall be of 0,60 mm thick flat mild steel (before galvanising), galvanised as specified for roofing sheets in clause 3.19.

PB 3.21 FIBRE CEMENT ROOFING SHEETS

Fibre cement roofing sheets shall be of the profile scheduled or shown on the drawings and shall comply with the requirements of SANS 685. The sheets shall be not less than 6 mm thick.

PB 3.22 ADJUSTABLE FIBRE CEMENT RIDGING

Adjustable fibre cement ridging for ridges of fibre cement covered roofs, shall be of same manufacture as the roofing sheets, of not less than 6 mm thick material, with overlapping end joints and shall suit the profile of the roofing sheets. Width of wing shall be not less than 300 mm measured from the centre of roll.

PB 3.23 FACIAS AND BARGE BOARDS

Facias and barge boards shall be, unless otherwise specified, of pressed fibre cement boards of section described in long lengths.

PB 3.24 FIBRE CEMENT FLASHINGS

Fibre cement flashing for horizontal top edges of roofs butting against vertical wall or other surfaces, shall be of same manufacture as the roofing sheets of not less than 6 mm thick material and with overlapping end joints. The flashings shall suit the profile of the roofing sheets and shall extend not less than 300 mm onto the roof sheeting, shall have plain upstands against the vertical surfaces and shall be flashed over with metal as described.

PB 3.25 FIBRE CEMENT GUTTERS

Fibre cement gutters shall be of approved manufacture, of not less than 6 mm thick material and with spigot and socket ends.

Gutter brackets shall be heavy quality galvanised steel or non-ferrous metal brackets as supplied by the manufacturers of the gutters.

PB 3.26 FIBRE CEMENT RAIN-WATER DOWNPIPES

Fibre cement rain-water downpipes shall be of approved manufacture, with spigot and socket ends. The material in circular rain-water downpipes 75 mm diameter shall be not less than 6 mm thick, and in circular pipes over 75 mm diameter and in all sizes of square and rectangular pipes, shall be not less than 8 mm thick.

Holderbats for rain-water downpipes shall be heavy quality galvanised steel or non-ferrous metal holderbats.

PB 3.27 CONCRETE ROOFING TILES

Concrete roofing tiles shall comply with the requirements of SANS 542, except that the concrete in the body of the tile need not be coloured where tiles have natural stone granular finish, and shall be of pattern and colour specified.

Unless otherwise specified, the tiles shall have natural stone granular finish.

PB 3.28 COVERING TO CEILINGS

(a) **Gypsum plasterboard ceilings with plaster finish**

Gypsum plasterboard for ceilings shall be 6,4 mm thick gypsum ceiling board, complying with the requirements of SANS 266.

The cover strips shall be galvanised or lacquered wire gauze not less than 60 mm wide. The plaster shall be a retarded semi-hydrate wood-fibre plasterboard bonding gypsum plaster.

(b) **Fibre cellulose board ceilings**

Fibre cellulose board for ceilings shall comply with the requirements of SANS 803 and, unless otherwise specified, shall be 6 mm thick and of flat (unpressed) type.

PB 3.29 COVE CORNICES TO CEILINGS

(a) **Gypsum plasterboard cornices**

Cove gypsum plasterboard cornices to ceilings shall comply with the requirements of SANS 622 and shall be of 82 mm or 120 mm girth as specified.

(b) **Timber cornices**

Timber cornices to ceilings shall be 32 mm hardwood Scotia's.

PB 3.30 FLAT FIBRE CEMENT SHEETS

Flat fibre cement sheets other than fibre cellulose boards described in sub-clause 3.28(b), shall comply with the requirements of SANS 685.

PB 3.31 TIMBER FOR JOINERY

Softwood for joinery shall comply with the requirements of SANS 1359 and hardwood with the requirements of SANS 1099.

Timber for joinery shall be of clear grade, unless otherwise specified. Counter tops and other tops, where only one face side is visible, shall be of semi-clear grade timber.

PB 3.32 FRAMED AND LEDGED BATTEN DOORS

(a) **Softwood doors**

To be 44 mm thick framed and ledged batten doors complying with the requirements of SANS 545, but the timber shall comply with the requirements of SANS 1359 and shall be of clear grade.

(b) **Hardwood doors**

To be 44 mm thick framed and ledged batten doors complying with the requirements of SANS 545, but the timber shall comply with the requirements of SANS 1099 and shall be of clear grade. The hardwood shall be solid without any laminations.

PB 3.33 FLUSH DOORS

Flush doors shall be solid laminated, chip core or hollow-core as specified and shall comply with the requirements of SANS 545. All glue used in the manufacture of the doors shall comply with the requirements of the above specification.

Unless otherwise specified, face veneers shall be rotary cut, and shall be of timber specified or where doors are to be painted shall be of timber suitable for painting.

Edge-strips to conceal the vertical edges of doors shall be not less than 10 mm thick and of the same timber as face veneers; edge strips to meeting edges of doors in two leaves where edges are to be rebated, shall be not less than 20 mm thick.

Faces of doors shall be machine-sanded to a smooth and even surface.

All glueing together of core strips and glueing on of veneers, edge-strips, etc. shall be done under hydraulic pressure.

The top and bottom edges of doors showing end grain, shall be sealed with lacquer, or other suitable material, before leaving the manufacturer's works, and similarly sealed after doors are fitted into frames if the edges of doors are disturbed during fitting.

PB 3.34 IRONMONGERY

All ironmongery shall be of best quality and shall be approved by the Engineer, before fixing.

Screws for fixing of articles shall be of similar metal than the articles.

Locks shall comply with the requirements of SANS 4 and shall be supplied with two keys each.

Unless otherwise specified, interior and exterior doors shall be fitted with two and four lever heavy-duty mortice locks respectively, which shall be master-keyed.

No key shall pass a second lock. On no account shall the keys be delivered with the doors or locks to the building site. Failure to observe these instructions may entail the provision of new locks and keys.

PB 3.35 HOT-DIP GALVANISING TO STEELWORK

Where prescribed, all steelwork built in as the work proceeds, shall be hot-dip galvanised after fabrication and before leaving the manufacturer's works, in accordance with SANS 763.

Where they occur, site welds shall be zinc sprayed in order that the zinc coating be even and continuous over all surfaces.

PB 3.36 PRESSED STEEL DOOR FRAMES

Pressed steel door frames shall comply with the requirements of SANS 1129 and shall be constructed of 1,6 mm thick mild steel sheeting, pressed or rolled to the required shapes, properly mitred, welded and reinforced.

Frames shall be of widths required to suit the thickness of walls into which they are built and shall be fitted with suitable tie-bars and braces at bottom, and lugs for

building in, three to each jamb of frames without fanlights and four to each jamb of frames with fanlights.

Where fanlights are shown over doors, the frames shall be fitted with transoms of pressed or rolled steel sheet as above and rebate for fanlights and for doors if required.

The rebates in frames and transoms for doors and fanlights shall be of width required to suit the thickness of doors and fanlights.

Frames shall each be fitted in the rebate of one jamb with a pair of approved 100 mm steel butt hinges, and transom to opening fanlights hung at bottom shall each be fitted with a pair of approved 75 mm steel butt hinges, all set flush into recesses in frames and either fixed with countersunk screws or securely welded on.

Frames shall be holed as and where required for screws fixing fanlight openers, keeps of spring catches, etc. Where fanlights are shown to be fixed into frames, the frames shall be holed in the rebates, for screws, securing the fanlights, four to each frame.

Frames shall each be fitted in one jamb, with approved chromium plated or stainless steel (unless otherwise specified) adjustable striking plate keep, boxed in at back of frame with sheet metal box welded on, and not less than two rubber buffers.

All welding shall be cleaned off smooth and flush on exposed faces and frames shall be cleaned and primed as described for steel windows before leaving the manufacturer's works.

PB 3.37 STEEL DOORS, SIDELIGHTS AND FANLIGHTS

Steel doors, sidelights and fanlights shall, in the case of stock types, comply with the requirements of SANS 727, and in the case of purpose made types with the constructional and other requirements of the above specification wherever applicable, and shall in addition be equipped with the following:

(a) Suitable weather bars where required to render doors, etc., perfectly watertight;

(b) Suitable lugs, or holes at the same spacing as the standard fixing lugs, for screwing frames to plugs in the concrete, where frames of doors, etc. are to be fixed to concrete columns, beams, etc.,

(c) A primer as described for steel windows, except where hot-dip galvanising is prescribed.

Doors, sidelights and fanlights, unless otherwise shown shall be of "one piece" construction, but where shown to be in two or more "one piece" units, the units shall be coupled together with standard coupling-mullions and/or transoms.

Bottom openings in doors and sidelights shall be fitted with kicking plates of one thickness of 1,6 mm thick mild steel sheet fixed with metal beads.

Frames of outward opening doors shall be fitted at bottom with sills of door framing section (stepped sills) and of inward opening doors with metal ties, welded to frames, for embedding in thresholds (flush sills).

Stock doors, sidelights and fanlights shall be of the types shown on drawings and purpose made doors, sidelights and fanlights shall be constructed to the forms and sizes shown on drawings.

Unless otherwise specified, the doors shall be of not less than 33 mm universal sections and the sidelights and fanlights of standard 25 mm sections.

Fanlights shall be hung and fitted as described for steel windows in clause 3.39.

PB 3.38 BALANCE TYPE STEEL DOOR

The balance type steel door shall be of the "back track" type tip-up door, constructed of not less than 0,8 mm thick mild steel sheeting, pressed to form troughed or fluted pattern horizontal panels, each approximately 200 mm wide, all strongly reinforced at back with 1,2 mm thick top hat section mild steel braces and/or stiffeners and provided all round exposed edges with 1,2 mm thick mild steel channels, all properly welded together and with all welding cleaned off smooth and flush.

The door is to be hung on two galvanised flexible steel cables of not less than 5 mm diameter, connected at lower ends to 125 mm diameter steel encased counterweights of such length and mass as will balance the door in the full open position and connected at upper ends to door unit by passing cables over 140 mm diameter bushed cast aluminium pulleys, securely fixed to 2,50 mm thick mild steel top plates.

The movement of door is to be controlled by means of sintered metal rollers, (nylon rollers are not acceptable) securely fixed at top and centre of outer edges to door unit to operate in horizontal and vertical runner guides respectively. The guides are to be formed of 37 mm x 32 mm x 25 mm mild steel channels and with vertical channels fitted at upper ends with horizontal channels, welded on to form back track for top rollers. Each vertical channel is to be four times bolted to jamb of door opening and each horizontal channel is to be secured in position to internal wall with mild steel angle bracket, twice bolted to wall to form rigid construction.

The counterweights to door to be encased with 2,50 mm thick mild steel cover plates, each the full height of door and securely fixed to wall and channel guide.

Door to be fitted near bottom with cast aluminium lifting handle for operating the door and with chromium plated locking handle, complete with control rods and with striking plate bolted to lintel, over door opening. The locking handle is to be operated from outside and is to be provided with two keys.

Before leaving the manufacturer's works, all metal is to be given a protective priming coat of paint in accordance with the requirements of SANS 909.

PB 3.39 STEEL WINDOWS

Stock residential and industrial type steel windows shall comply with the requirements of SANS 727 and all other types both stock and purpose made shall comply with the constructional and other requirements of the above specification wherever applicable, and shall in addition be equipped with the following:

(a) Suitable weather bars where required to render the windows perfectly watertight;

(b) Suitable lugs, or holes at the same spacing as the standard fixing lugs, for screwing frames to plugs in the concrete where frames of windows are to be fixed to concrete columns, beams, etc.,

(c) Windows and components, except where specified to be hot-dip galvanised, shall before leaving the manufacturer's works, be cleaned by acid pickling rinsing and drying, as laid down in SANS code of practice 064, or by other approved means, to remove all scale, rust, grease, oil and foreign matter and then primed with red oxide zinc chromate primer complying with the requirements of SANS 909, applied by dipping or by means of spray gun.

Ventilators hung at side to open out in windows above ground floors and not accessible for cleaning from an adjoining opening ventilator in the same window or from verandas, balconies and the like, shall be hung on projecting hinges.

Windows, unless otherwise specified, shall be of "one piece" construction, but where shown to be in two or more "one piece" units, shall be coupled together with standard coupling mullions and/or transoms.

Windows shall be fitted with solid brass handles, stays, catches and other fittings, those to windows constructed of universal sections having polished finish and to all other windows rumbled finish. The fittings shall be fixed in such a way as to be removable after windows are glazed.

PB 3.40 RESILIENT FLOOR FINISHINGS

Semi-flexible vinyl (vinyl-asbestos) floor tiles shall comply with the requirements of SANS 581; flexible vinyl (PVC) floor tiles and sheeting shall comply with the requirements of SANS 786 and thermoplastic (asphaltic) floor tiles shall comply with the requirements of SANS 586. Unless otherwise described, the flooring shall be of marbled pattern and of approved light colour and tiles shall be 230 mm x 230 mm or 250 mm x 250 mm in size.

Vinyl cove skirtings shall be of approved manufacture and colour and unless otherwise stated, 70 mm in height.

PB 3.41 GLASS FOR GLAZING

Glass for glazing shall comply with the requirements of CKS 55.

Glass not exceeding 0,75 square metre surface area of glass pane, shall be flat drawn clear sheet glass of "QQ" quality (ordinary glazing quality) and of 3 mm thickness.

Glass exceeding 0,75 square metre and up to 1,5 square metres surface area of glass pane, shall be clear float glass of "GG" quality (glazing quality) and of 4 mm thickness.

Laminated safety glass for glazing shall be of "SQ" quality (selected glazing quality) and of 6 mm thickness unless otherwise specified. If high impact strength glass is used, whether cut to size or not, the stencil mark is to appear in a prominent place on the glass.

Toughened safety glass for glazing up to 3 square metres shall be, unless otherwise specified, of 4 mm thickness and must be ordered to the correct size as toughened glass can not be cut, and each piece of glass to be marked in a clear and permanent fashion. (For bigger sizes, manufacturer's instructions are to be followed).

Any pane of glass installed in any door shall, where not made of safety glass, be not more than 1 m^2 in area and shall have a nominal thickness of not less than 6 mm.

Obscure glass for glazing, unless otherwise specified, shall be Arctic or other similar approved figured rolled glass, of a nominal thickness of not less than 3 mm for glass panes up to a surface area of 0,75 square metre and not less than 5 mm over 0,75 square metre.

Putty for glazing shall comply with the requirements of SANS 680, of Type I for glazing in wood and of Type II for glazing in steel windows, doors, etc. Putty used for glazing in unpainted hardwoods, shall be tinted to match the colour of the wood.

PB 3.42 PAINTS

All materials for paint work for which South African Bureau of Standards specifications have been published, shall comply with the requirements of such specifications and shall bear the standardisation mark of the South African Bureau of Standards on the container or packing. Materials for paint work for which no SANS specifications have been published shall be of brand and manufacture approved by the Engineer.

All materials for paint work must be brought on to the site in unopened containers and no adulteration will be allowed.

Undercoats for paint work shall be as supplied by the manufacturer of the paint being used for the finishing coat.

Paints shall be suitable for application on the surfaces on which they are to be applied, and those used externally shall be of exterior quality or suitable for exterior use.

If necessary, paints shall be strained free from skins and similar impurities immediately before application.

The various primers, undercoats, paints and distempers shall comply with the requirements of the specifications quoted hereunder and shall be of the type of grade stated, viz:

(a) **Primers**

- (i) For wood:
- SANS 678. Type I shall be used on exterior woodwork and Type III on interior woodwork.
- (ii) **For metal:**
- **Dip or spray application (red oxide zinc chromate).** For steel windows, doors, door jambs, and other articles normally dip or spray primed in the manufacturer's works: SANS 909.
- **Brush application (zinc chromate).** For all metal surfaces primed on site and then painted: SANS 679, Type I.
- (iii) **For structural steel (red lead)**
- SANS 312, Type II, Grade I.
- (iv) **For galvanised iron**
- SANS 912.
- (v) **For galvanised metal surfaces and surfaces of non-ferrous metals**

- Wash primer (metal etch primer) : SANS 723.

(b) **Undercoats**

For all surfaces under HIGH GLOSS, OIL GLOSS, FLAT and EGGSHELL finishing paints : SANS 681, Type II.

(c) **Paints**

- (i) High gloss : SANS 630
- (ii) Oil gloss : SANS 631
- (iii) Flat and eggshell: SANS 515
- (iv) Emulsion paint (interior) : SANS 633, Grade I
- (v) Emulsion paint (exterior) : SANS 634, Synthetic Polymer Base Type, but pure acrylic resin base for asbestos cement surfaces
- (vi) Aluminium paint : SANS 682, Grade II
- (vii) Roof paint : SANS 683, Type B
- (viii) Structural steel paint : SANS 684, Type B
- (ix) Epoxy tar : SANS 801 (types as specified)

(d) **Distemper**

SANS 322

(e) **Varnish for interior use**

SANS 887, Type I with eggshell finish.

PB 4.0 PLANT

PB 4.1 GENERAL

The Contractor shall have at his disposal the normal plant necessary for the proper and neat completion and rounding off of all facets of the building work.

PB 5.0 CONSTRUCTION

PB 5.1 BRICKLAYER

PB 5.1.1 Cement Mortar

Cement mortar will, unless otherwise specified, be composed of four parts by volume of sand and one part by volume of cement for normal brickwork, and three parts by volume of sand and one part by volume of cement for reinforced brickwork.

The ingredients for cement mortar shall be measured in proper gauge boxes on a boarded platform and thoroughly mixed. Alternatively mixing may be by means of an approved mechanical batch mixer. Only when the dry ingredients have been thoroughly mixed and a mixture of uniform colour has been obtained may the water be added in sufficient quantity to obtain mortar with the required consistency.

Care shall be taken in mixing cement mortar to remove from the mixing machine or platform any old mortar that has already set, as such mortar must not be incorporated in any new batch.

Cement mortar shall be produced in such quantities as can be used before commencing to set, as no cement mortar that has once commenced to set shall be used in any way.

PB 5.1.2 Brickwork

Brickwork, wherever practicable and not otherwise specified, shall be built in English bond. No false headers shall be used, and none but whole bricks employed, except where legitimately required to form bond.

The brickwork, unless otherwise specified, shall be built in 4:1 cement mortar. Brick arches and brick lintels shall be built in 3:1 cement mortar.

The bricks shall be laid on a solid bed of mortar and all joints thoroughly grouted up solid throughout the whole width of each course.

The brickwork shall be carried up in a uniform manner, no portion being raised more than 1,2 m above an adjacent portion.

The bricks shall be well saturated with water, in the stack or dump, approximately two hours before being used. The tops of walls left off, shall be well wetted before work is recommenced.

All rough and fair cutting and cutting of splays, skew backs, chamfers, etc., shall be properly performed.

All necessary openings for pipes, etc., shall be formed or left and made good after pipes, etc., are fixed in position.

Walls generally shall be taken up two courses above panelled ceilings in the same mortar as the wall below and cut between ties, etc.

Where hollow concrete masonry units are used brick-force shall be built into the walls every third course. Mortar for hollow concrete masonry units shall consist of one part cement, two parts lime and nine parts sand by volume. All cavities below floor level shall be filled with Grade 15 MPa/19 mm concrete.

PB 5.1.3 Mortar Joints

Mortar joints to brickwork generally shall be 10 mm in thickness.

The joints in brickwork receiving plaster, tiling or similar finishings, shall be raked out whilst the mortar is soft to form key for the plaster or mortar backing. The depth of the raking out will depend on the condition of the bricks; the rougher the bricks on

face the shallower the raking out and the smoother the bricks the deeper the raking out.

The joints in brickwork shall be flushed off where walls are to be bagged, in readiness for the bagging.

PB 5.1.4 Brickwork in Thicknesses

Walls built in two or three thicknesses shall be tied together with and including metal ties of sufficient length to allow not less than 75 mm of each end to be built into brickwork and shall be spaced not more than 1 m apart to every third course and staggered.

PB 5.1.5 Brickwork in Linings

Linings to concrete shall be tied with and including 4 mm diameter galvanised crimped wire ties of necessary length to allow 75 mm to be bedded into concrete and 75 mm of the other end to be built into brickwork and evenly spaced 1 m apart to every third course and staggered.

PB 5.1.6 Half Brick Thick Walls

Half brick thick walls shall be built in 4:1 cement mortar and reinforced with 75 mm wide brick reinforcement, one row to every eighth course in height, and built 100 mm into main connecting walls. The reinforcement shall be lapped 150 mm at end joints, where these are necessary, and 75 mm at angles.

PB 5.1.7 Cavity Walls

Cavity walls, unless otherwise specified, shall be built with two half brick thicknesses of brickwork in stretcher bond with 50 mm cavity between, and the two thicknesses tied together with 200 mm long metal wall ties of the butterfly type, spaced at not more than 1 m centres alternately to every third course of brickwork.

Unless otherwise specified, the brickwork shall be built in 4:1 cement mortar.

The cavities shall be carried up from one course of brickwork below damp course level up to two courses below wall plate level, unless otherwise shown or specified. The brickwork above cavities shall be built solid, and where 270 mm thick shall be cut and well bonded where possible. Cavities in foundation walls of cavity walls shall be filled with Grade 15 MPa/19 mm up to 150 mm below the damp-proof course level.

The cavities shall be kept free of all rubbish, mortar droppings and projecting mortar.

The tops of walls shall be covered with planks or sacking during wet weather to prevent rain from entering the cavities.

The cavities shall not be ventilated.

At door, windows and other openings, the cavities shall be stopped 110 mm back from jambs of openings with the inner thickness of brickwork returned and stopped against the outer thickness and not bonded to same. A 110 mm wide strip of damp-proof sheeting as described for damp-proof course in clause 3.15 shall be built in between the two thicknesses in the joint formed by the return and the outer thickness. The damp-proof strip shall be lapped at least 50 mm on to the sheeting between the two thicknesses of sills and between the two thicknesses of lintels.

Sills to windows shall be divided into external and internal thicknesses with strips of damp-proof sheeting as above, built in line with the damp-proof sheeting in jambs and extending 100 mm beyond the jambs of openings.

The lintels shall be provided with damp-proof sheeting as described under lintels.

Unless otherwise specified, cavities shall be stopped one course below and one course above and 110 mm from sides of openings for air bricks and the like.

PB 5.1.8 Reinforced Brick Lintels

Reinforced brick lintels shall be built with sound machine made bricks, in 3:1 cement mortar, with all vertical and horizontal joints filled solid with mortar throughout the required number of courses and to a distance of at least 330 mm on either side of the clear opening.

The number of courses in lintels over the various size openings shall be as specified in table hereunder, and reinforcing steel wires or rods shall be built into the first horizontal joint over the bottom course as laid down therein, viz.:

LINTEL SPAN	NUMBER OF COURSES	REINFORCEMENT
Not exceeding 1 m	4	One row of 75 mm wide brick reinforcement for each half brick width soffit.
Over 1 m tot 1,5 m	6	One row of 75 mm wide brick reinforcement for each half brick width soffit.
Over 1,5 m tot 2,1 m	7	Three 6,3 mm diameter mild steel rods for each half brick width of soffit.

The reinforcing wires and rods shall be of length at least equal to the width of the clear opening plus 330 mm at each end. The reinforcement shall be evenly spaced in the brick joints, with the outer wires or rods having at least 20 mm cover from face of brickwork.

Brick lintels in 270 mm thick cavity walls shall be built in two half brick thicknesses in stretcher bond, with inner face of outer thickness for a depth of three courses above soffit, covered with sheeting as for damp-proof course, the full length of lintels, and space between the two thicknesses for the depth of the sheeting filled in solid with Grade 15 MPa/19 mm concrete. Where cavities continue above lintels, the sheeting shall be taken up and turned on to top of first course of brickwork to inner thickness of wall, above the concrete filling in lintels.

The lintels, except where built over pressed steel door frames and the like, shall be supported on temporary formwork left in position for at least fourteen (14) days.

PB 5.1.9 Beam Filling

Beam filling, unless otherwise specified, shall be half brick thick, built in similar mortar as used in the walls below, cut in between roof timbers and carried hard up to underside of roof covering, and flushed up in mortar.

PB 5.1.10 Bagged Finish to Brickwork

Bagged finish to brickwork, if done whilst the mortar in joints is still soft, shall be formed by rubbing over the wall surfaces with wet rough sacking, until all joints and

crevices are filled up and an even surface is obtained. Mortar, as used for building the brickwork, shall be added as may be necessary.

If bagging to walls is done after the mortar in joints has set the wall surfaces shall be rubbed over with wet rough sacking as above, but cement grout shall be added as necessary to fill up the joints and crevices and to obtain an even surface.

PB 5.1.11 Building In In-brick Work

Ends of timbers, holdfasts, cramps, gratings, air bricks, dowels, etc., shall be built-in in cement mortar.

Door and window frames and the like shall be set up in positions for building in and securely strutted to prevent distortion whilst the brickwork, lintels, etc., are being built.

Pressed steel door frames shall be grouted in solid at back with cement mortar as the work proceeds.

Wood slips, fixing bricks, hoop iron, roof ties, etc., shall be built in as the work proceeds.

Ventilators shall be built into openings formed in the walls, in 3:1 cement mortar, and grouted in solid with similar mortar and wall finishes made good if disturbed.

Wood frames to doors, windows, etc., shall be set up in position for building in as described and built in as the work proceeds with cramps to jambs of 1,6 mm thick galvanised hoop iron, 32 mm wide, with ends turned 50 mm up against stiles of frames and each twice screwed to frame, and built 450 mm into wall with end turned up into brickwork joint. Cramps shall be built in approximately 0,3 m up from bottom and approximately 0,3 m down from head of frames and intermediately at not exceeding 0,85 m apart. No frame shall have less than two cramps to each jamb irrespective of height.

Cramps to frames in 270 mm thick cavity walls shall be cranked as necessary and built into inner and outer thicknesses of walls alternately.

The stiles of wood door frames, and similar frames not having sills framed in, shall be doweled to concrete, brick, stone and similar thresholds with 10 mm diameter mild steel dowels 75 mm long, one to each stile.

PB 5.1.12 Securing of Roofs

Roof trusses shall be fixed at each support to walls with ties of 1,2 mm thick galvanised hoop iron, 30 mm wide, built 750 mm deep into brickwork or embedded 300 mm deep into concrete or wrapped around bottom layer of reinforcing in a reinforced concrete beam and, unless otherwise specified, wrapped over truss and fixed with four galvanised nails, 60 mm long and taken up to and lapped round the nearest purlin and well spiked thereto.

PB 5.1.13 Bedding and Pointing

All door, window and similar frames shall be bedded and pointed in 3:1 cement mortar. All wall plates shall be set true and level and bedded in 4:1 cement mortar.

Steel door and window frames shall be carefully pointed all round and made perfectly watertight.

Where steel door and window frames are specified to be pointed with mastic compound they shall be pointed all round externally with an approved waterproof compound, of such composition that it will not stain surrounding surfaces, and that it will adhere tenaciously, remain plastic without sagging or running, be capable of accommodating any normal movement of the joint sealed, and will receive paint without "bleeding". The pointing material shall be forced into the joints, which shall have been previously prepared to receive same, by means of a pressure gun, or by other suitable method, all in accordance with the manufacturer's instructions.

PB 5.1.14 Faced Brickwork

Faced brickwork shall be built fair and the joints shall be square recessed to a depth of approximately 6 mm, formed with a square jointing tool well pressed into the joints as the work proceeds.

The Contractor shall construct a test section of 10 m^2, which shall be approved by the Engineer, before continuing with faced brickwork.

Face bricks shall be sorted by the brick manufacturer at his yard or by the Contractor on the site, to ensure that proper mixing of the bricks within the colour range of each type of facing brick being used is obtained; sudden changes in the general colour of face work in any one type of facing brick will not be acceptable.

Sand in mortar for all faced brickwork shall all be from one source.

Faced brickwork shall be kept perfectly clean and rubbing down of the brickwork shall not be allowed. Scaffold boards shall be turned back during rain to avoid splashing. Soiled brickwork shall be cleaned at the Contractor's expense, and the cleaning method shall be approved by the Engineer.

PB 5.1.15 Fibre Cement Sills

Sills shall be in single lengths cut between reveals, fitted with fixing lugs and solidly bedded in 3:1 cement mortar with a slight projection beyond the finished wall face below.

Internal sills shall be level. External sills shall be set sloping on cut brickwork or on fine concrete filling under.

PB 5.1.16 Laying of Quarry Tiles

Joints to paving shall be continuous in both directions.

Tiles shall be solidly bedded and jointed in 3:1 cement mortar with joints, unless otherwise specified, 6 mm wide and slightly pointed with a round jointing tool. Tiles shall be well soaked in water before fixing and thoroughly cleaned off after fixing.

Tiles in sills, copings, etc., shall be set with slight projection over finished wall face, and where full tiles do not fit into the length, two cut tiles shall be used, symmetrically placed as directed.

PB 5.1.17 Installation of Electrical Service

The Contractor shall embed in the concrete and/or brickwork, as the work proceeds, all conduits, boxes, etc., which will be fixed in position by the electricians, and must cut all necessary chases and holes in walls for conduits and form recesses in walls for distribution boards, all in the positions directed, notwithstanding whether the installation of the electrical service is carried out by the Contractor or under a separate contract. Alternatively, distribution boards may be built into walls as the work proceeds, providing prior approval are obtained from the Engineer.

The Contractor shall afford every facility and shall render reasonable assistance to the electricians in carrying out their work, and shall make good where necessary, in all trades, after installation has been completed.

PB 5.1.18 Installation of Mechanical Equipment

Where the installation of mechanical equipment is carried out under a separate contract the Contractor shall arrange for the building in of special fittings, leaving holes and openings or forming chases in floors, walls, etc., for pipes, cables etc., and for the building in of pipes, sleeves, pipe clips, bolts, etc., as required or directed.

All cutting of holes through finished floors, walls, etc., after the concrete or mortar has set, must be avoided as far as possible, and the Contractor must give ample notice to the Engineer who will ascertain the exact positions where pipe sleeves, pipes, pipe clips, etc., are to be built in.

PB 5.1.19 Protect And Clean Down Brickwork, Etc.

Angles of face brickwork, reveals, steps, etc., liable to damage shall be covered up and protected during the progress of the remaining work, and any damage done shall be made good at the Contractor's expense and to the satisfaction of the Engineer.

Face brickwork and brick and tile sills, copings, etc., shall be cleaned down as the work proceeds, and surfaces liable to be soiled by mortar or plaster splashes during the progress of the remaining work shall be covered with paper, pasted on, or by other approved means. At completion of the works the coverings shall be removed and the surfaces again cleaned down to the satisfaction of the Engineer.

Any detergent or other materials used in the cleaning down of face brickwork, etc., shall be of such nature that will not harm adjoining paint and other finishings in any way.

All tile and other pavings shall be thoroughly cleaned off after laying to remove all traces of mortar and other substances, covered up and protected from damage during the progress of the works, and again cleaned off at completion.

PB 5.2 TILER

PB 5.2.1 Laying of Glazed Ceramic Wall Tiles

The tiles shall be fixed direct to walls in 3:1 cement mortar with horizontal and vertical joints continuous, and shall have all joints rubbed in solid with neat white cement grout. Tiles shall be well soaked in water before fixing and thoroughly cleaned off after fixing.

Unless otherwise specified, the wall tiling shall project approximately 4 mm beyond face of adjoining plaster with all exposed edges finished with glazed rounded edge tiles.

Tiling shall be returned into reveals of openings and on to window sills, and shall be butted at internal angles and provided with glazed rounded edged tiles to external angles, unless otherwise specified.

All necessary cutting to tiles shall be properly performed.

Walls shall be well wetted before tiling is commenced.

PB 5.2.2 Laying of Ceramic Floor Tiles

Ceramic tiles shall be bedded to a true and even surface on 3:1 cement mortar and with joints not exceeding 2 mm wide.

After the tiles have been allowed to set for a period of not less than twenty four hours the joints shall be grouted in to with approved epoxy compound, or acid proof cement mortar.

PB 5.3 PLASTERER AND PAVIOR

PB 5.3.1 Cement Plaster

Cement plaster for one coat work on walls shall be composed of four parts of sand and one part of cement for internal work, and five parts of sand and one part of cement for external work, all by volume, and mixed as described for cement mortar in clause 5.1.1.

Cement plaster on concrete surfaces shall be composed of three parts by volume of sand and one part by volume of cement.

PB 5.3.2 Forming Key to Concrete for Plaster Finish

All surfaces of concrete receiving plaster, or similar finishings, shall be well wetted and wire brushed immediately after the formwork is removed and slushed over with 2:1 cement grout to form key for the finish, to the approval of the Engineer. The slushing must be allowed to set hard before the finish can be applied.

Other methods may be used if approved by the Engineer.

Particular care shall be taken in forming the key for plaster where steel shuttering is used, and if considered necessary the surface of the concrete shall be hacked.

PB 5.3.3 Thickness of Plaster

Plaster on walls shall be not less than 12 mm or more than 20 mm in thickness, and plaster on concrete ceilings and beams shall be not less than 9 mm or more than 16 mm in thickness, unless otherwise specified.

PB 5.3.4 Application of Plaster

Walls shall be well wetted before plastering is commenced.

The surfaces of internal plaster shall be steel trowelled to a smooth, even and true finish. External plaster shall be finished to a true and even surface with a wood float. All plaster surfaces shall be free from blemish.

Plaster shall be returned into reveals and soffits of openings, and all angles shall be true and straight with salient angles slightly rounded.

The rendering coat of plaster in two coat work shall be approved by the Engineer before the setting coat is applied, and notice shall be given to the Engineer when it is ready for inspection.

All cracks, blisters and other defects shall be cut out and made good and the whole left perfect at completion.

NB - See clause 5.3.2 for forming key for plaster on concrete.

PB 5.3.5 Normal Screeds to Floors

Concrete sub-floors finished with wood mosaic, vinyl sheeting and tiles, and similar finishings, shall be screeded with 3:1 cement mortar, of thickness required, but in no case less than 12 mm, and steel trowelled to a true and smooth surface suitable to receive finishings.

The screeding shall be laid before the concrete sub-floors have matured otherwise the exposed surfaces of concrete shall be thoroughly cleaned with a wire brush, and a coat of neat cement grout applied immediately before the screeding is laid.

The screeding shall be laid in good time to allow of it being perfectly dry when the finishings are laid.

No traffic shall pass over nor shall any building operations take place on the screeding without proper covering first being provided.

PB 5.3.6 Granolithic Screeds

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

Granolithic screeds to floors, treads of steps, thresholds, and similar horizontal surfaces unless otherwise specified, shall be not less than 25 mm thick. Granolithic screeds to stair risers, sides of kerbs, and other vertical surfaces, shall, unless otherwise specified, be not less than 20 mm thick. Exposed salient angles of granolithic screeds shall be neatly rounded to approximately 20 mm radius, unless otherwise specified.

The granolithic screeds shall be laid before the concrete sub-floor has matured otherwise the exposed surface of concrete shall be thoroughly cleaned with a wire brush, and a coat of neat cement grout applied immediately before the granolithic screed is laid.

The granolithic screeds shall be laid in panels not exceeding 9 m^2 in area, and joined to lines of panels and lined into smaller squares as directed with sunk V-joints. The joints between the panels shall coincide with joints in the concrete sub-floor where possible.

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

All granolithic work shall be done by experienced workmen, and shall be protected from injury caused by rain or other extreme weather for twelve hours after being laid, and against too rapid drying whilst hardening, by being covered with wet sacks, or other suitable material, and shall be protected from injury and discolouration during the progress of the remaining work.

Edges of granolithic floors butting against different floor finishings, and edges of margins, etc. shall be true and sharp, and shall be protected by fixing temporary wood strips, which shall remain, in position until the commencement of the laying of the adjoining flooring material.

PB 5.3.7 Reedings to Steps, Etc.

The treads of granolithic finished steps and upper surfaces of granolithic finished external thresholds shall be rendered non-slip by reeding same near front edges for a width of 100 mm stopped 100 mm from ends.

PB 5.3.8 Power Floated Finish

Power floated finish to floors etc., unless otherwise specified, shall be floated mechanically to smooth and even surfaces before the concrete has set. Small surfaces and inaccessible places to be floated by hand in a similar way. Under no circumstances is cement mortar to be added while floating the concrete.

PB 5.3.9 Laying of Concrete Paving Slabs and Paving Bricks

Concrete paving slabs and paving bricks shall be bedded and jointed on a layer of 30 mm clean river sand which is dry. Joints shall be 6 mm wide, continuous in both directions, filled solidly with 3:1 cement mortar and slightly pointed with a round jointing tool. Lengths in excess of 10 metres shall be provided with expansion joints.

PB 5.4 WATERPROOFING

PB 5.4.1 Damp-proof Course in Walls

The damp-proof course shall be the full thickness of walls above foundations and shall be laid without longitudinal joints. At end joints, angles and intermediate junctions the sheeting shall be lapped 150 mm.

Where so specified all laps in the damp-proof course shall be sealed over the whole area of laps, to an approved method. Care shall be taken not to tear or otherwise damage the sheeting.

PB 5.4.2 Damp-proof Membrane

The damp-proof membrane under floors, etc., shall be laid in the widest practical widths to minimise joints and shall be turned up, dressed to load bearing walls and if applicable lapped with the damp-proof course in the walls. All joints shall be sealed with pressure sensitive tape applied over the leading edge of the joint.

PB 5.4.3 Expansion Joints

Expansion joints shall be at least 10 mm wide and filled in with approved bitumen impregnated softboard or closed cell expanded polyethylene strip. Expansion joints shall be sealed with a two component polysulphide joint sealer, 12 mm deep, according to instructions of the manufacturers.

PB 5.5 CARPENTER AND JOINER

PB 5.5.1 Protection of Timber on Site

Timber stored on site shall be properly stacked when received, and adequately protected against extremes of weather and exposure to the sun, until required for use.

PB 5.5.2 Wrought Faces

Exposed woodwork, unless otherwise specified, shall be wrought to a smooth surface, and properly sand-prepared to remove all machine or other tool marks.

For each wrought face on structural timber, an allowance will be made off the "nominal" dimensions specified or stated on the drawings, as follows:

(a) 2,5 mm for "nominal" dimensions up to and including 76 mm;

(b) 3,5 mm for "nominal" dimensions over 76 mm.

For each wrought face on joinery timber, an allowance will be made off the "nominal" dimensions specified or stated on the drawings, as follows:

(a) 3 mm for "nominal" dimensions up to and including 76 mm;

(b) 5 mm for "nominal" dimensions over 76 mm.

The above will be the nett allowances permitted off the "nominal" dimensions specified or stated on the drawings and will not be additional to the tolerances specified for sawn timbers.

All exposed angles of wrought woodwork, unless otherwise specified, shall be arris rounded. The term "arris rounded" denotes that the angles shall be rounded off to approximately 3 mm radius.

Angles of wrought woodwork specified to be angle rounded shall be rounded off to 6 mm radius, unless otherwise shown on the drawings, and shall include, in framed joinery, for housed and mitred joints.

PB 5.5.3 Lengths of Timbers and Methods of Jointing

Plates, purlins, battens, laths, slats, etc., shall be in single lengths, but where this is not possible the end joints will be formed as described below. The jointing of plates, battens, etc. at junctions and angles shall also be formed as stated hereunder, viz:

(a) Wall plates shall be halved at joints and well spiked together, and also at junctions and angles;

(b) Purlins shall be splayed or spliced at joints and, unless otherwise specified, using timber side plates of the same dimensions as purlins, not less than 600 mm long and four times bolted with M10 mild steel bolts, with two washers each. Adjacent purlins shall not be splayed or spliced in the same bay or on the same rafter;

(c) Sawn battens, laths, slats, etc., shall be butt jointed at heading joints and angles, and wrought battens, laths, slats, etc., shall be splayed at heading joints and mitred at angles, all over points of support and where adjacent, shall not be jointed on the same rafter.

PB 5.5.4 Joints in Roof Trusses

(a) The number of connecting devices to be used at each intersection between two members at any heel joint or any splice in a truss shall be determined from the following table:

SPAN m	3 (90 x mm) NAILS PLUS M10 BOLTS AS SPECIFIED BELOW	M16 BOLTS ONLY	50 mm TOOTHED RING CONNECTIONS
3	2	2	1
4	3	2	1
5	3	2	2
6	4	3	2
7	5	3	2
8	5	3	2
9	6	4	3
10	6	4	3

(b) In the case of any joint other than a heel joint or splice, one M10 bolt plus three 90 x 4 mm nails shall be used.

PB 5.5.5 Prefabricated Roof Trusses

Prefabricated timber roof trusses shall be constructed of South African pine as described in clause 3.17 to the designs shown on the detail drawings. The timber shall be of cross-sectional dimensions shown, cut to correct lengths with ends square or cut to the required angle, and shall be assembled in truss fabricating jigs with the truss having the proper camber, and tightly clamped together and joints secured with approved connector plates of galvanised steel sheet, pressed into the timber simultaneously on both sides of the truss with hydraulic press capable of exerting such pressure as will ensure complete penetration of the teeth into the timber. The connector plates shall be of such size as will ensure that the joints so made will adequately withstand the forces exerted on the joints, and to have at least two coats Epoxy Tar finish for coastal areas.

PB 5.5.6 Valleys in Roofs

Valleys in roofs covered with galvanised steel or asbestos roofing sheets or with roofing tiles shall each be formed with two 228 mm x 25 mm sawn boards, spiked down to roof timbers, and purlins fixed along outer edges where in galvanised steel and asbestos sheet covered roofs and battens along outer edges where in tile covered roofs.

PB 5.5.7 Purlins

Unless otherwise specified, purlins shall be 50 mm x 76 mm and shall be securely nailed to roof timbers at not exceeding 1,14 m centres, ranging perfectly straight and square to the roof with but joints at heading joints and angles and in the case of wrought purlins splayed joints at heading joints and mitred joints at angles.

PB 5.5.8 Brandering to Ceilings

The brandering shall be 38 mm x 38 mm, securely spiked up to the supporting timbers with 88 mm wire nails at 380 mm centre-to-centre. Cross brandering shall be cut in between the longitudinal brandering and securely skew nailed to same with 75 mm wire nails at joints in ceilings and at edges where required for fixing of cornices.

PB 5.5.9 Steel Roofing Sheets

The sheets shall be secured to wood purlins with approved galvanised iron roofing screws each provided with a plastic or asphalt felt washer and a galvanised steel cup washer over the plastic or felt washer and secured to steel purlins with M6 galvanised hook bolts, provided with similar washers under nut.

Screws and bolts at ends of sheets and at end laps shall be spaced at not exceeding two corrugations apart wherever possible, but in no case more than three corrugations apart, and at intermediate purlins at not more than four corrugations apart; screws or bolts shall, in all cases, be provided in the outermost corrugations of the upper sheets.

All necessary cutting to sheets shall be properly performed. Cut edges at sides of valleys, and elsewhere exposed, shall be perfectly straight.

At exposed verges of roofs the iron shall be finished with neatly formed rolls.

The sheets shall have side laps of not less than one and a half corrugations. The minimum roof slopes and sheet end laps shall be, unless otherwise specified, as prescribed in Table 2 of Schedule 2 of Part L of the National Building Regulations and Building Standards Act, 1977.

PB 5.5.10 Metal Ridging For Steel Covered Roofs

The ridging shall be 450 mm girth with roll top and bent down edges, and shall be lapped 225 mm at end joints, cut and properly lapped and fitted at intersections of ridges, hips and valleys, and close beaten into corrugations of roofing iron. Roll shall be closed at feet of hips and at end of ridging.

Ridging shall be fixed with screws to wood purlins and hook bolts to steel purlins, with washers under heads and nuts, respectively, all as described for fixing roofing sheets, and spaced at not exceeding 300 mm centres.

PB 5.5.11 Fibre Cement Roofing Sheets

The sheets shall be mitre-cut at corners as necessary and laid with smooth surface on top, and shall be secured to wood purlins with 7 mm diameter galvanised drive screws not less than 114 mm long, and to steel purlins with M8 galvanised hook bolts, each provided with a plastic or asphalt felt washer and a galvanised steel cupped washer over the plastic or felt washer.

Screw and boltholes in sheets shall be drilled (not punched), and shall be 0,2 mm larger than the diameter of screws and bolts.

The fixing screws, and nuts on fixing bolts, shall not be tightened more than is necessary for the holding down of the sheets and for the proper seating of the washer over the corrugations, so as to allow for slight movement between the sheets and the supporting structure. On no account shall sheets be deflected at the intermediate purlins in an attempt to make the sheets bear on such purlins.

The side laps of sheets shall be sheltered from the prevailing wind by laying the sheets from left to right, or from right to left, depending on the direction of the prevailing wind, the sheets being laid in the opposite direction to that of the wind.

All necessary cutting to sheets shall be properly performed. Cut edges at sides of valleys, and elsewhere where exposed, shall be perfectly straight.

The minimum roof slopes and sheet end laps shall be, unless otherwise specified, as prescribed in Table 1 of Schedule 2 of Part L of the National Building Regulations and Building Standards Act, 1977.

The manufacturer's instructions regarding laying and fixing of sheets, including side laps, mitring of corners and spacing of screws or bolts, shall be followed in all cases.

One month after fixing, the roof covering shall be thoroughly examined, any defects made good and loose screws or bolts tightened.

Roof boards shall be used by all workmen for safety and to avoid damage to the sheeting.

PB 5.5.12 Adjustable Fibre Cement Ridging

The ridging shall be secured to wood purlins with screws and to steel purlins with hook bolts, passed through the roofing sheets, and provided with plastic or felt and steel washers, all as described for fixing fibre cement roofing sheets.

The manufacturer's instructions regarding laying and fixing of the ridging, including spacing of screws or bolts, shall be followed in all cases.

PB 5.5.13 Fascias and Barge Boards

Fascias and barge boards of pressed fibre cement boards shall be butt jointed with 75 mm wide x 3 mm thick galvanised steel plates four times bolted with M6 galvanised bolts over joints.

PB 5.5.14 Fibre Cement Flashings

Fibre cement flashings shall be secured to wood purlins with screws and to steel purlins with hook bolts, passed through the roofing sheets, and provided with plastic or felt and galvanised steel cupped washers, all as described for fixing fibre cement roofing sheets.

The manufacturer's instructions regarding fixing of the flashings, including spacing of screws or bolts shall be strictly adhered to.

PB 5.5.15 Fibre Cement Gutters

Fibre cement gutters shall be bedded in approved bituminous mastic compound and secured with M6 galvanised gutter bolts with heads of bolts on inside of gutters and each bolt provided with asphaltic felt and galvanised steel washer under head and nut, all in accordance with the manufacturer's instructions.

The inside surfaces of sockets and the outside surfaces of spigot ends shall be coated with a thin solution of bitumen to enable the compound to adhere fast when applied, and surfaces of washers in contact with each other and with gutters hall be coated with bitumen. After tightening the bolts, all surplus compounds from the joints shall be removed, and the joints externally finished with neatly trowelled fillets of 2:1 cement mortar.

The spigot ends of gutters shall be lapped on to the socket ends in the direction of the flow wherever possible.

The gutters shall be fixed with proper falls on gutter brackets of the fascia type where fixed to fascia boards and of the purlin type where fixed to purlins. Brackets shall be securely screwed to the roof timbers, at not exceeding 1 m centres, and with extra brackets at angles and outlets.

Gutters shall be provided with all necessary angles, stopped ends, outlet nozzles, etc., jointed to gutters as described above.

PB 5.5.16 Fibre Cement Rain-water Down pipes

Fibre cement rainwater down pipes shall be jointed with tarred hemp rope gasket caulked into each joint, and the joint filled with a suitable bitumen compound and finished off with neatly trowelled fillet of 2:1 cement mortar.

The pipes shall be fixed to walls with holderbats, bolted around pipes immediately below the socket, and with tails builds into walls in 3:1 cement mortar.

Rainwater down pipes shall be provided with all necessary swan necks, branch pieces, plinth bends, radius bends, shoes, etc., jointed to pipes as described above.

PB 5.5.17 Concrete Roofing Tiles

Tiling shall be "straight or broken bond", and vertical joints between tiles and bottom edge of each course of tiles shall range perfectly straight. Unless otherwise specified, interlocking tiles shall be laid to a lap of at least 100 mm and plain tiles to a lap of at least 62 mm.

Half tiles in the case of interlocking tiles, and tile-and-a-half in the case of plain tiles, shall be provided as required at abutments and at verges of roofs. Plain tile roofs shall be provided with double course at eaves.

Unless otherwise specified, each tile in every third course in the case of interlocking tiles, and in every fifth course in the case of plain tiles; all tiles in eaves courses and ridge courses; end tiles in every course at each side of hips and valleys; all tiles adjoining bonnet hip tiles in plain tile roofs; half tiles, full tiles and tile-and-a-half at verges, and all tiles to open eaves and open overhanging verges, shall be fixed to the battens with galvanised nails of such length as will penetrate the battens to a depth of at least 25 mm.

Tiling shall be carefully cut and dressed at hips and valleys and, where necessary at abutments, etc. Mitred portions of tiles at hips and valleys shall be holed and properly secured.

Hip and ridge tiles for interlocking tile roofs shall be socketed V-type, shall match general tiling, and shall be bedded solid in 3:1 cement mortar with strip of approved bituminous sheeting laid under the mortar bedding, of such width as will give a lap of at least 25 mm on to the roof tiling at each side, and lapped not less than 75 mm at end joints.

Socketed joints of hip and ridge tiles shall be bedded in mortar as above and pointed with neatly recessed joints, and hip iron of 25 mm x 4,5 mm mild steel 300 mm long, suitably bent, twice holed and securely nailed to hip rafter, shall be provided at foot of each hip. The mortar bedding shall be trowelled smooth at open ends of ridges.

Ridge tiles for plain tile roofs shall be as above but half-round and but jointed and neatly pointed in tinted 3:1 cement mortar, and hip tiles shall be round pattern bonnet type, to course and bond in with general tiling, and with each tile bedded and neatly pointed in mortar as above and nailed to hip rafter with galvanised nail.

Hip and ridge tiles shall be neatly cut and fitted together at junctions between ridges and hips or valleys, and shall be bedded solid and neatly pointed in tinted 3:1 cement mortar with approved bituminous sheeting under the mortar bedding, cut to shape required and with lap of 25 mm on to the roof tiling.

PB 5.5.18 Covering to ceilings

(a) **Gypsum plasterboard ceilings with plaster finish**

The ceiling boards shall be in 900 mm or 1 200 m widths, with board at ends of ceilings of widths required to suit length of ceilings. Ceiling board shall be in single lengths to the width of ceilings wherever possible.

The boarding shall be nailed to the brandering, with GREY surface to underside, with 2 mm diameter galvanised or cadmium plated clout headed nails, 38 mm long, spaced at not more than 100 mm apart at edges of boards and 150 mm apart along the intermediate brandering.

The joints between boards shall be loose butt joints and covered with wire gauze strips nailed through the boarding to the brandering at 400 mm centres with 38 mm galvanised clout headed nails.

The bonding plaster shall be applied in two layers by the trowel-float-method to a total thickness of not less than 6 mm, and well pressed into the wire scrim over the joints between the ceiling boards, and finished smooth, even and true.

(b) **Fibre cellulose board ceilings**

The ceiling boards shall be in the same widths, and fixed as specified for gypsum plasterboard ceilings in paragraph (a).

The joints between the boards shall be covered with 25 mm half-round wood cover beads fixed with 38 mm long nails spaced at not exceeding 300 mm.

PB 5.5.19 Cove Cornices to Ceilings

(a) **Gypsum plasterboard cornices**

Cove gypsum plasterboard cornices shall be nailed through the ceiling boards to the brandering and to wall plugs, at not exceeding 200 mm centres, with 2 mm diameter galvanised or cadmium plated clout headed nails, 38 mm long, or fixed to walls with hardened steel nails driven into the brickwork.

Cornices shall be scribed at internal angles and mitred at external angles and shall be in long lengths with splayed heading joints where necessary.

(b) **Timber cornices**

Scotia's shall be fixed to walls with hardened steel nails driven into the brickwork.

PB 5.5.20 Trap Doors in Ceilings

Openings for trap doors in ceilings shall be formed with 38 mm x 38 mm brandering all around each opening, spiked together and to bottom edge of the supporting timbers. Size of opening, unless otherwise specified, shall be 650 mm x 650 mm.

Trap door shall be formed with skeleton frame of 50 mm x 38 mm brandering, covered on underside with boarding as for ceiling, and hung on a pair of 75 mm steel butts and fitted on underside near closing edge with 100 mm brass bow handle. Soffit of trap door shall be flush with soffit of ceiling when closed, and trap door shall flap back on to top of the brandering, between tie beams or ceiling joists when open.

When trap door is closed it shall rest on 50 mm x 19 mm fillets, fixed on soffit of ceiling all around opening, mitred at angles and securely screwed up to the trimmers. Fillets shall project 12 mm into the opening to carry the trap door.

Trap doors larger than 650 mm x 650 mm shall each be provided with 38 mm x 38 mm brandering across centre, spiked to the skeleton frame.

PB 5.5.21 Ceiling Insulation

Ceilings shall be insulated, where so specified, with approved resin bonded or stitched fibre glass or mineral wool insulation blanket 38 mm thick, cut to size and laid over brandering between ceiling joists and tie beams, etc.

Where insulation is to be in two thicknesses a total thickness of 76 mm is required and the joints shall be staggered.

PB 5.5.22 Framed Joinery

Where the word "Framed" is used it is to include for all mortice and tenon joints, dovetail joints, grooves, stop grooves, rebates, stop rebates, housings, notchings, etc., including housing ends of shelves, divisions, etc.

PB 5.5.23 Joinery

Joinery work shall be put in hand immediately after the order has been given to commence work, or after the receipt of detail, where such are to be supplied, and shall not be wedged or glued up until just before fixing in the building.

No framed joinery for services situated inland shall be manufactured in the humid coastal belt, and no framed joinery for the services situated in the coastal belt shall be manufactured inland. This applies to both purpose made and stock joinery.

All exposed softwood timber in joinery which is not to be painted shall be free from large, loose or dead knots, knot holes, checks, splints, wane or other defects, and in joinery which is to be painted shall be free from all defects other than those which can be filled or otherwise made good in such a way as will not impair the paint finish. All exposed hardwood joinery timber shall be free from all knots, knot holes, checks, splints or other defects and, unless otherwise specified, shall also be free of sapwood.

Purpose made joinery shall be manufactured strictly in accordance with detail drawings.

Stock joinery shall be of approved quality. Joinery shall not be primed until it has been inspected and approved.

Skirting, rails and the like shall be in long lengths. Heading joints where necessary shall be splayed. Counter tops, table tops, drainers, and the like, shall be formed with wide boards, jointed with grooved, cross-tongued and glued joints or with grooved rebated and glued joints of approved type; cross-tongues shall be stopped 25 mm back from ends where ends are exposed to view. The boards shall be in single lengths to top, etc., but where this is not possible the heading joints shall be staggered and jointed as above.

Skirting, rails, angle moulds and beadings of all kinds, shall be close fitted, mitred or scribed at angles, and securely fixed; skirtings, rails and the like shall be fixed with hardened steel or other suitable nails driven into the brickwork or shall be nailed to wall plugs spaced at not more than 700 mm apart. Glazing beads and the like shall be mitred at angles and, unless otherwise specified, shall be fixed with panel pins.

PB 5.6 METALWORK

PB 5.6.1 Manufactured Steelwork Generally

Welding is to be done electrically in the most up to date manner by skilled workmen and cleaned off on completion.

All welds are to be welded with welding rods of the same chemical composition as the tubes, rods, bars, etc., to be welded and all external welds are to be filed clean and smooth.

Welding shall be continuous fillet welding to all exposed edges unless otherwise described.

No scaffolding shall be allowed to rest on or fixed to steel windows, doors, frames, etc., in any way.

PB 5.7 RESILIENT FLOOR FINISHINGS

PB 5.7.1 Laying and Fixing

Vinyl sheeting and tiles and such like floor finishings shall be laid in strict accordance with the manufacturer's instructions, on a perfectly dry and clean screeded surface, using an adhesive supplied or recommended by the manufacturer of the flooring material, and rolled with a suitable roller to ensure complete adhesion of the material. The flooring shall be cut where required and neatly fitted against adjoining floors, thresholds, etc. Vinyl skirtings shall be close fitted to floors and walls, butted at end joints, neatly mitred at internal angles and dressed round external angles, and fixed with adhesive as for flooring.

Unless otherwise described, sheet flooring shall be in standard widths with cut sheets at sides of floors as necessary.

PB 5.8 GLAZIER

PB 5.8.1 Fixing of Glass

Glass fixed with glazing beads in unpainted hardwood doors shall be bedded on strips of rubber, velvet, leather, or felt turned over on to both sides of glass in the rebates to form a soft packing between the glass and the woodwork. In all other cases the glass shall be well bedded in back putty in the rebates.

Glass rebates, other than in unpainted hardwood doors, shall be primed before glazing.

Glass panes exceeding 0,5 m^2 in surface area and fixed with putty only in wood doors, sashes and the like shall be secured in addition with glazing sprigs, and in

steel windows and doors with glazing pegs or clips inserted in holes in the steel framing.

Glass panes shall have adequate clearance between the edges of glass and the rebates.

Putty shall be carefully trimmed and cleaned off with front putty worked to within 3 mm of the sight lines.

PB 5.9 PAINTER

PB 5.9.1 Preparatory Work

(a) **General**

All floors must be swept clean and walls dusted down, and surfaces not being painted such as face brickwork, sills, floors and stained woodwork covered up and protected against spotting, before any painting is commenced.

No sweeping or dusting shall be done whilst painting is in progress or whilst paint is still wet.

(b) **On woodwork**

Woodwork being painted shall be well brushed down, knots treated with knotting, and all surfaces primed, stopped with hard stopping and rubbed down to an even surface ready to receive the paint.

Woodwork being oiled or stained shall have all plaster stains, pencil marks and other surface discolourations and blemishes carefully removed, and stopped with tinted stopping and well rubbed down.

(c) **On metalwork**

All metal surfaces being painted, except steel structures shall be cleaned of all rust, scale and dirt by scraping or by means of steel wire brushes; also all oil and grease shall be removed and a perfectly clean surface obtained. If necessary the surface shall be decreased immediately before applying the priming coat, by the use of a suitable grease-removing solvent; any salt deposits on the metal surfaces as may occur in industrial and marine atmospheres shall be removed by the use of a suitable detergent and the surface then thoroughly rinsed and allowed to dry.

New galvanised metal surfaces and surfaces of all non-ferrous metals, which are to be painted, shall be cleaned down as above and given one coat of wash primer (metal etch primer).

Protective coatings on new galvanised metal surfaces, applied by the manufacturers to prevent storage stain and white rust, shall be completely removed by the use of a suitable cleaning agent and the surfaces thoroughly rinsed and allowed to dry, before the surfaces are primed or painted.

After cleaning off rust on metalwork those portions so affected shall be treated with an approved rust inhibitor.

(d) **On plaster**

All plastered wall, ceiling and such like surfaces being painted or distempered shall be filled where necessary with suitable stopping or patching plaster and the whole rubbed down ready to receive the finishings.

(e) **On ceilings**

Boarded ceilings, cover strips and cornices being painted or distempered, shall be filled where necessary with suitable stopping and all nail heads in ceilings, cover strips and cornices being distempered shall be primed with flat paint.

PB 5.9.2 Surfaces to Be Dry

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

PB 5.9.3 Priming

Wood, metal and other surfaces normally primed before being painted shall be prepared and primed as before described in readiness to receive the specified paint system.

Backs of wood door and similar frames and surfaces of other new or refixed joinery in contact with brickwork, etc., and built in as the work proceeds, shall be primed before building in whether the articles are to be painted or not, to prevent moisture seeping into the wood from the mortar bedding.

Wood surfaces shall be knotted, primed and stopped before being coated with emulsion paint or distemper.

Tongued and grooved and rebated edges of boards in batten doors, and other suchlike inaccessible parts of joinery shall, before the joinery is assembled, be primed or where the joinery is to receive a finish other than paint, be given one coat of such other finishing material.

Priming to external structural timbers shall be applied before the timbers are fixed in position and shall include all wrought surfaces, such as backs of fascia and bargeboards.

PB 5.9.4 Application of Paint

All coats of paint shall be thoroughly dry before subsequent coats are applied and rubbed down where necessary.

All work shall be finished to colour approved by the Engineer. The tints of undercoats shall approximate those of the finishing colour and in order to indicate the number of coats applied and to avoid misses when applying a succeeding coat, a slight difference shall be made in tint of each coat.

Priming on wood surfaces shall be by brush application. Priming on surfaces other than wood shall be by brush application or if in the opinion of the Engineer, the primer and the surfaces are considered suitable for roller application, the primer may be so applied. Priming applied by brush application shall be well brushed in to obtain maximum penetration.

Undercoat and finishing coats may be applied by brush or roller.

The use of spray gun on site for application of paint will not be permitted, except in the case of cellulose and other special cases where spraying is the accepted method of application; in cases where spraying is permitted all surrounding surfaces shall be properly masked.

The finishing coat on woodwork and metalwork, unless otherwise specified, shall be of high gloss paint. All materials shall be used in strict accordance with the manufacturer's instructions.

PB 5.10 PROTECTION AND CLEANING OF WORKS

The Contractor shall provide all necessary dust sheets, covers, etc., and shall exercise all necessary care to prevent marking surfaces of walls, floors, ceilings, glass, electrical fittings, etc., and shall keep all parts of the works perfectly clean and free at all times from spotting, accumulation of rubbish, debris or dirt arising from the operations. Any surface disfigured or otherwise damaged shall be completely renovated or replaced as necessary, to the Engineer's approval, by the Contractor at his own expense.

The Contractor shall test all doors, fanlights and windows and all other fittings for proper operation and effect the required rectification prior to the handing over of the building.

The premises shall be left clean and fit for occupation at the completion of the work.

PB 6.0 TOLERANCES

PB 6.1 BASIS OF MEASUREMENT

PB 6.1.1 General

Permissible deviations will apply in the case of linear dimensions, position, and level. The Contractor shall construct each of the various parts of the works within the limits of the applicable permissible deviations set out in clause 6.2 unless some other degree of accuracy is required in terms of the project specification or is shown on the drawings.

PB 6.1.2 Methods of Measurement of Deviations

Certain deviations will be measured as set out below:

(a) Any deviation from flatness of a plane surface will be measured as the maximum deviation of the surface from any straight line of length 3 m joining two points on the surface, determined by means of a straight edge the ends of which are supported on identical blocks of suitable thickness placed one over each of the points.

(b) Any abrupt change in a continuous surface, including a local depression or peak in a floor or wall, will be measured as specified in (a) above.

(c) Out-of-squareness of a corner or an opening or an element such as a column will be measured by taking the longer of two adjacent sides as the base line, and determining any departure from the perpendicular of the side at either end of this base line.

PB 6.2 PERMISSIBLE DEVIATIONS

The permissible deviations for elements or components shall be as follows:

(a) Position on plan of any edge or surface measured from the nearest grid line or agreed centre line. ..... ± 25 mm

(b) Linear (other than cross-section) dimensions ..... ± 30 mm

(c) Cross-section dimensions ..... - 10 + 20 mm

(d) Level (deviation from designed level with reference to the nearest transferred datum (TD) of the upper or lower surface, as may be specified, of any slab or other element or component) ..... .± 10 mm

(e) Out-of-squareness of a corner or an opening or an element such as a column (See clause 6.1.2(c)) for short side of length:

(i) up to and including 0,5 m .....± 5 mm

(ii) over 0,5 m up to and including 2 m ..... .± 15 mm

(iii) over 2 m up to and including 4 m ..... .± 20 mm

(f) Exposed surface (including floor slabs and paving):

(i) Flatness of plane surface .....± 5 mm

(ii) Abrupt changes in a continuous surface .....± 5 mm

(g) Exposed surface to be plastered or receive normal or granolithic screeds:

(i) Flatness of plane surface ..... ± 10 mm

(ii) Abrupt changes in a continuous surface .....± 5 mm

(h) Surface of plaster and normal or granolithic screeds .....± 5 mm

PB 7.0 TESTS

PB 7.1 GENERAL

The Engineer shall have free access to the works for taking samples and carrying out tests. The Contractor shall render any assistance necessary. If so required, the Contractor shall provide storage and protection of such samples on site.

PB 8.0 MEASUREMENT AND PAYMENT

PB 8.1 GENERAL

PB 8.8.1 All items in this section will be measured by number, square metre or linear metre completed and the tendered rates shall include full compensation for the supply, delivery, handling and installation of all materials, the provision of all necessary labour and supervision, transport, plant, equipment and incidentals necessary to complete, protect and maintain the works as specified or as shown on the drawings.

PB 8.1.2 Where a lump sum is required for a complete structure the tendered rate shall include all items and contingencies, as specified in this section or as shown on the drawings.

PB 8.2 SCHEDULED ITEMS

PB 8.2.1 Brickwork Unit : m^2

Brickwork will be measured on the centre line of the walls. Areas occupied in walls by windows and doors will be excluded from the areas measured, and corners and intersections common to more than one brick wall will be measured once only.

The rate shall cover the cost of brickwork complete as specified, including test sections where specified, pointing, providing brick lintels, brick reinforcement and ties, etc., the building in of conduits, beams, pipe sleeves, doors and windows, the raking out of joints and the filling of cavities in cavity walls and walls constructed of hollow concrete masonry units, below floor level and elsewhere where specified.

The test section for faced brickwork as specified in clause 5.1.14 shall only be paid for if approved by the Engineer and, if rejected, shall be removed at the Contractor's expense.

PB 8.2.2 Air Bricks

(a) External air bricks ..... Unit : No

(b) Internal air bricks ..... .Unit : No

The rate shall cover the cost of providing and building in the air bricks as specified.

PB 8.2.3 Bagged Finish to Brickwork Unit : m^2

The rate shall cover the cost of providing rough sacking, additional cement grout as required and finishing the bagging as specified.

PB 8.2.4 Window Sills

(a) External (describe) .....Unit : m

(b) Internal (describe) .....Unit : m

The rate shall cover the cost of providing and building in face bricks, asbestos cement sheets or any other material prescribed, as well as all accessories specified.

PB 8.2.5 Tiling Unit : m^2

The rate shall cover the cost of providing all material and the laying and grouting of tiles, complete as specified.

PB 8.2.6 Plaster Work Unit : m^2

The rate shall cover the cost of the construction of the plaster work, including the supply of all materials, mixing, applying, finishing, forming reveals, joints, etc., complete as specified.

PB 8.2.7 Floor Screeds

(a) Normal screeds .....Unit : m^2

(b) Granolithic screeds .....Unit : m^2

The rate shall cover the cost of the construction of the floor screeds, including the supply of all materials, mixing, laying, finishing, the forming of nosings, reedings,

skirtings, etc. and, where the concrete sub-floor has matured, of the brushing and applying a cement grout, complete as specified.

PB 8.2.8 Paving **Unit : m^2**

The rate shall cover the cost of providing paving slabs or bricks, sand bedding and joint filling and expansion joint material and of constructing the paving.

PB 8.2.9 Waterproofing

(a) Damp-proof course in walls ..... Unit : m

(b) Damp-proof membrane under floors ..... Unit : m^2

The unit shall be the net length or area of waterproofing installed. The length or area of overlaps shall not be measured for payment.

The rate shall cover the cost of providing and laying all material as specified, including the sealing of all laps and joints, complete as specified.

PB 8.2.10 Expansion Joints **Unit : m**

The rate shall cover the cost of providing and installing all filling and sealing material and of the forming of expansion joints, complete as specified.

PB 8.2.11 Structural Timber

(a) Wall plates (indicate size) ..... Unit : m

(b) Beams (indicate size) ..... Unit : m

(c) Joists (indicate size) ..... Unit : m

(d) Rafters (indicate size) ..... Unit : m

(e) Purlins (indicate size) ..... Unit : m

(f) Brandering (indicate size) ..... Unit : m

(g) Roof trusses complete (indicate drawing number) ..... Unit : No

The rate shall cover the cost of the supply of all materials, manufacture, cutting, waste, laps, joints and fixing of the timber as indicated, including nails, bolts, nuts, washers, hoop irons, ties and other fixtures required, complete as specified.

PB 8.2.12 Roof Covering **Unit : m^2**

The rate shall cover the cost of providing and fixing all roof covering material as prescribed, including all flashings, soakers, valleys, ridge coverings, roofing screws and all other fixtures required to complete the work, as specified.

PB 8.2.13 Facias and Barge Boards **Unit : m**

The rate shall cover the cost of providing and fixing of all material, fixtures, screws, bolts, nuts, washers and other accessories required to complete the work, as specified.

PB 8.2.14 Gutters and Rain-water Down Pipes

(a) Gutters ..... Unit : m

(b) Rainwater down pipes ..... .Unit : No

The rate shall cover the cost of supply and building in of all material including angles, stopped ends, outlet nozzles, gutters, gutter brackets, etc. for gutters and swan necks, branch pieces, plinth bends, radius bends, shoes, brackets, etc. for rain-water down pipes, including all bolts and sealants, complete as specified.

PB 8.2.15 Ceilings

(a) Ceilings ..... Unit : m^2

(b) Cornices to ceilings..... Unit : m

The rate shall cover the cost of supply and installation of all material including cover strips to joints, nails, trap doors and gypsum plaster where prescribed, complete as specified.

PB 8.2.16 Ceiling Insulation **Unit : m^2**

The rate shall cover the cost of supply and installation of all material, as specified.

PB 8.2.17 Joinery

(a) Doors (type and size indicated) ..... Unit : No

(b) Skirtings (size indicated) ..... Unit : m

(c) Other items (describe or indicate drawing number) ..... Unit : No or m

The rate shall cover the cost of the supply of all material, manufacture, cutting, waste, fixing and installation of the joinery items, complete as specified.

The rate for doors shall also cover the cost of the door frames and all accessories, such as hinges, hooks, bolts, locks, latches, etc., and of damp-proof course on both sides and above door frames in cavity walls, as specified.

PB 8.2.18 Metalwork **Unit : No**

The rate shall cover the cost of supplying all material, manufacture, applying priming coat of paint or galvanising, as specified, delivery and building in of units, including burglar proofing where specified, locks, catches, glazing, etc., and of damp-proof course under all windows and on both sides and above frames in cavity walls, as specified.

PB 8.2.19 Resilient Floor Finishings

(a) Vinyl-asbestos, PVC, or thermoplastic floor tiles (specify) ..... Unit : m^2

(b) Vinyl cove skirting ..... Unit : m

The rate shall cover the cost of supplying all material and adhesives required and the laying of the floor finishings.

PB 8.2.20 Painting **Unit : m^2 or Sum**

Only the surface covered by the final finishing coat shall be measured.

The rate shall cover the cost of surface preparation, supplying and applying all the coats of paint, repairing any damaged surfaces, and all materials necessary for completing the work.

PB 8.2.21 Electrical Installation ..... Unit : Sum

The rate shall cover the cost of supplying and building in of all equipment such as switchboards, conduits, wires, cables, sockets, light fittings, etc., cutting recesses, chases and holes in walls as required and repairing any damaged surfaces after installation, including testing of the installation.

PB 8.2.22 Miscellaneous ..... Unit : No, Sum or m

The rate shall cover the cost of all workshop detail drawings, where prescribed, material, plant, tools and labour to complete the scheduled items complete, as detailed, including corrosion protection and/or painting, as specified, and building in.

SECTION 4 : PARTICULAR PROJECT SPECIFICATIONS – MECHANICAL & ELECTRICAL

PMA – PARTICULAR MECHANICAL & ELECTRICAL

INDEX

SECTION 1 : GENERAL

PMA 1.1 DATA TO BE SUPPLIED BY TENDERERS

Full particulars of the material and equipment offered shall be submitted at the time of tendering, and all information requested shall be supplied on the information sheets in this contract document. Any additional information shall be given in a covering letter and all drawings, sketches, pamphlets, etc., shall be submitted with the tenders.

PMA 1.2 PLANT DRAWINGS

Within as short a time as possible, but not exceeding one (1) month of the placing of a contract, the Contractor shall supply the Engineer, in triplicate, with fully dimensioned drawings of the plant and equipment ordered from him and of the position and sizes of all foundations, bolt holes, openings in walls or floors and other special features, affecting construction of the works, so that the Engineer can arrange for the necessary concrete work, foundations, bolt holes, openings for pipes, cable ducts, etc., for the proper erection and installation of the plant.

Any cutting or alteration of structural work arising from inadequate or incorrect dimensions and particulars afforded by the Contractor, or through late receipt of such particulars, will be arranged by the Engineer to be carried out as he thinks fit at the expense of the Contractor concerned under this contract.

PMA 1.3 PACKING

All plant, equipment, apparatus and pipework likely to be damaged in loading or unloading, or through chafing or through being subjected to pressure, or likely to deteriorate through exposure to the atmosphere, is to be suitably packed so as to prevent such damage.

PMA 1.4 QUALITY OF MATERIAL AND ACCEPTANCE

Any material and/or workmanship which is found to be unsound, damaged or contrary to the specification, or which is found during the defect's liability period or during tests in situ to be defective, or in any way contrary to the specification due to causes within the Contractor's control and responsibility shall be rejected.

All material rejected by the Engineer shall be replaced or repaired by the Contractor at his own expense to the instructions and satisfaction of the Engineer.

PMA 1.5 TIME OF DELIVERY AND COMPLETION

Tenderers are to state in the schedule of prices, the periods in which they undertake to effect complete delivery of all material under the contract from the date of placing the order. Tenderers are also to state the period in which they undertake to complete all erection, adjustment, putting into proper working order and testing of all plant and material after receipt of the order from the Engineer to commence erection or after the date of final delivery of material, whichever is later.

PMA 1.6 IMPORT PERMITS

No special import permits will be available for the importation of materials under this contract. Tenderers shall tender therefore on the understanding that if they are awarded the contract, the materials will be supplied ex local stocks or that importation will be affected from their own permit quota.

Tenderers are to bear in mind that preference will be given, other things being generally equal to tenders offering material of local manufacture.

PMA 1.7 OPERATING AND MAINTENANCE MANUAL

The Contractor shall prepare and supply manuals for the successful operation and maintenance of the installation. A draft of the manual shall be submitted after commissioning for approval. The draft shall then be corrected, if required, and three sets of the manual shall be submitted before first acceptance of the plant will be taken.

These manuals shall contain the following information:

Section 1 : System description

A comprehensive description of the system including schematic diagrams, where required for clarification.

Section 2 : Commissioning data

The results of all checks and measurements as recorded during the commissioning period shall be included and shall be compiled in such a manner that every check and measurement is clearly defined.

Section 3 : Operating instructions

3.1 Pre-start checklist for each individual plant.

3.2 Starting and stopping instructions.

3.3 Plant running checklist.

3.4 Safety precautions to be taken.

3.5 Manual operation.

3.6 Operator's duties.

Section 4 : Mechanical equipment

4.1 Description of all major items of equipment with the make, model number, names, addresses and telephone numbers of the supplier, manufacturer or their agents.

4.2 Design capacities of all equipment including selection parameters, selection curves, capacity tables etc.

4.3 Manufacturer's brochures and pamphlets.

4.4 Schedule of spares with part numbers recommended to be held in stock by the owner.

4.5 Pressure vessel (e.g. receiver) test certificates.

Section 5 : Maintenance instructions

5.1 Schedule of maintenance particulars.

5.2 Part numbers of all replacement items.

5.3 Capacity curves of driven equipment.

5.4 Sizes, types and lengths of drive couplings.

5.5 Serial numbers of principal pieces of equipment.

Section 6 : Electrical equipment

The following information shall be provided for all electrical equipment whether switchboard or field mounted.

6.1 Electrical equipment schedule with make, model number, rating, commissioning setting and name, address and telephone number of supplier.

6.2 Maintenance instructions.

6.3 Manufacturer's brochures and pamphlets.

Section 7 : Instrumentation and control

7.1 Description of each individual control system.

7.2 Control equipment schedule with make, model number, rating, commissioning setting and name, address, and telephone number of supplier.

7.3 Manufacturer's brochures and pamphlets.

7.4 Maintenance instructions.

Section 8 : Drawings

Paper prints or reduced sized prints of all Contractor's drawings (mechanical and electrical) update to "as built" drawings.

The contract will be considered incomplete until all tests have been conducted to the satisfaction of the Engineer and all drawings and manuals have been handed over to the Engineer.

Failure on the part of the Contractor to meet the completion date shall delay the hand-over of the main contract.

PMA 1.8 **PROGRAMME OF WORK**

In carrying out erection, a definite scheme of operation shall be observed by the Contractor, and such scheme shall at all times be subject to the approval of the Engineer and be in accordance with his requirements.

The Engineer may, from time to time, by order in writing, without in any way invalidating the contract or giving to the Contractor any claim for additional payment, require the Contractor to proceed with the execution of the works in such order as in his opinion may be necessary, and may alter the order and suspend any part of the work at such time and times as he may deem desirable.

When the work must of necessity be carried out in conjunction with the work of other Contractors or with that of the Employer, it shall be co-ordinated and arranged in such a manner so as to interfere as little as possible with the progress of such other work, and so as to offer every reasonable facility to other Contractors or to departmental employees of the Employer.

PMA 1.9 **CONSTRUCTION WORK**

The erection and completion of the building work to house the plant and equipment, will be carried out either departmentally or under separate contract in advance of the delivery of the plant. Holes will be left in walls and foundations to accommodate piping, foundation bolts and other equipment to be erected under this contract, so that the Contractor will generally only be required to grout up these holes after the installation of the piping and equipment has been completed, unless specified otherwise in the project specifications.

PMA 1.10 **ERECTION, ADJUSTMENT AND OPERATION**

The Contractor shall make his own arrangements for handling and transporting all material to the site of works in a proper and careful manner to avoid damage, and shall be responsible for properly storing and protecting all plant and equipment against damage by water, weather, fire and any other interference before and during erection.

This contract is to include for the erection, adjustment, putting into proper working order and upholding of all plant, equipment and materials supplied by the Contractor. The work of erection of the plant is to be carried out under a skilled and experienced erector and the plant, when erected is to be of neat and workmanlike appearance, solidly and evenly supported true to line and level, plumb and in proper working order. The erection is to include for the proper grouting in of all bolts, pipes, fittings and holes left by the building contractor for the reception of the equipment and pipes, as well as properly making good any damage to completed work, caused by the Contractor under this contract.

In the event of the Contractor not commencing erection when required by the Engineer, or his speed or quality of erection not being to the satisfaction of the Engineer, the Employer shall have the right to commence erection or to assist in or to complete erection with his own staff, or to engage another Contractor to do the work, in which case all expenditure so directly incurred by the Employer, plus the addition of twenty (20) percent thereon for administration and supervision will be debited to the Contractor and shall be recoverable from him in such manner as the Employer may elect.

On completion of erection, unless otherwise specified, the Contractor is to clean all exposed metalwork, polish parts to be left bright and paint all other parts, as instructed.

The Contractor is to finish off neatly all grouting and painting carried out by him and is generally to leave all his work under this contract clean, tidy and in an efficient working order.

After completion of erection, the Contractor is to operate his plant for at least seventy-two (72) hours or such longer time as may be necessary in order to put all equipment into proper adjustment and working order, using for this purpose the water and electricity provided free of charge by the Employer.

Before handing over the plant, the Contractor is to ensure that every part of the equipment is operating satisfactorily. The contract will not be considered complete until the Engineer is fully satisfied in this connection.

In the event of the Contractor being unable to test and adjust the plant and equipment at the time of installation through circumstances beyond his control, it may be necessary for him to return to site at a later date to undertake this work. An item has been provided in the schedule of prices to cover the cost of returning to site, if ordered by the Engineer to do so, in order to carry out this work.

The completion date will be taken as the date on which the plant is commissioned or when all the tests specified have been completed to the satisfaction of the Engineer, whichever date is the later.

SECTION 2 : MATERIALS

PMA 2.1 STANDARD SPECIFICATIONS

Reference made hereinafter to specifications of the South African National Standards (SANS) or the British Standards Institution (BS) shall be deemed to include all the latest revisions of and/or additions to such specifications, where applicable.

PMA 2.2 MATERIALS GENERALLY

All materials used shall be of the best of their respective kinds and shall be suitable for working at the pressures and temperatures involved under all working conditions without deteriorating or distorting or the setting up of undue stresses in any part. No welding, burning, filling or plugging of defective castings shall be permitted without the written approval of the Engineer.

PMA 2.3 CORROSION

Where corrosion of metal may be expected from contact with water or sewage or from any other cause, the Contractor shall supply materials, which are resistant to corrosion. Any material showing signs of corrosion, tuberculation or pitting before expiry of the defect's liability period shall be replaced by the Contractor at this own expense with materials to the Engineer's approval.

PMA 2.4 STRUCTURAL STEELWORK

All joists, angles, channels, plates and structural steel are to conform to BS 4369, Part 2.

PMA 2.5 PIPES AND FITTINGS

1. **Galvanised screwed and socketed tubes**

(a) All screwed and socketed pipes shall conform to SANS 62 so far as it may apply and if not amended by any other conditions in this contract. Pipes shall be medium class and galvanised.

2. **Steel and malleable iron pipe fittings**

(b) Pipe fittings to be used in conjunction with screwed and socketed pipes shall, as far as applicable, comply with the appropriate requirements of BS 1387 and BS 143, and shall be galvanised.

3. **Copper tubes**

All copper tubes shall conform to SANS 460 class 2, unless specified otherwise in the project specifications.

4. **Non-corrosive pipes and fittings**

Non-corrosive pipes and fittings shall be made of completely non-corrosive materials such as uPVC manufactured to SANS 966.

5. **Steel pipes and fittings**

All steel pipes and fittings shall comply with the requirements of SANS 719, where applicable, and shall be made of steel plate of not less than 6 mm thickness, unless specified otherwise in the project specifications.

6. **Cast iron pipes and fittings**

(c) All cast iron pipe, fittings and specials shall conform to SABS 509.

(d) Tenderers are at liberty to put forward any type of flexible coupling suitable for cast iron pipes but must submit full particulars at the time of tendering.

PMA 2.6 **VALVES AND FITTINGS**

1. **Sluice valves**

Sluice valves shall be double flanged standard waterworks pattern with non-rising spindles and shall conform, wherever applicable to the requirements of SANS 664 and shall be to class 16. All sluice valves shall be fitted with hand wheels with the direction of closing, which shall be clockwise when viewed from above, indicated thereon.

2. **Non-return valves**

Non-return valves shall be of the same quality and workmanship as that of the sluice valves. Each non-return valve is to be provided with suitable sized bypass. They shall be of a type that shall cause little head loss and shall be suitable for the class and type of pipe offered.

3. **Flanges**

Flanges shall comply with SANS specification 1123 and shall be drilled to the table indicated in the project specification.

Flanges shall be machined flat, i.e. without a raised joint face. Before the machined surfaces have become affected by rust, they shall be coated with a mixture of white lead and tallow or other approved protective composition.

PMA 2.7 **JOINTING MATERIAL**

The scheduled prices shall include for all jointing material to complete the installation of the pipework. In the case of flanged joints, this shall include bolts, nuts and rubber insertion rings, the latter complying with BS 2494, class E. The length of the bolts shall be such that when the joint is fully tightened up, two threads of the bolt shall be exposed. The diameter of the bolts shall comply with BS 4622.

SECTION 3 : PAINTING AND FINISHING

PMA 3.1 GENERAL

The following clauses shall apply to all items to be painted under this specification:

1. No paint will be applied unless the surface to be painted has been thoroughly cleaned to remove all traces of dust, grease, oil, millscale, rust or corrosion of any nature.
2. All metal surfaces shall be moisture dry before paint is applied. All paint surfaces shall be "hard" dry before a further coat may be applied, unless otherwise specified.
3. All surfaces which will be inaccessible after installation, shall receive the specified application before installation.
4. If the shop coat was left for a few months, the surface shall be rubbed down with emery paper or steel wool before final coats are applied. Washing down and scrubbing with clean water and hard brush is recommended.
5. The painter shall satisfy himself that the final coat completely covers the previous coat.
6. The dry film thickness shall be measured using a non-destructive thickness gauge similar to MIKROTEST.
7. In all cases the manufacturer's instructions must be strictly adhered to.

PMA 3.2 METAL PREPARATION

1. All steel surfaces shall be sandblasted to a minimum of Sa. 2½ (off-white) finish, to the Swedish specification S.I.S. 05/59/00.
2. The abrasive shall comply in all respects to SANS code 10064 and shall be free of any traces of oil, grease, foreign objects or corrosive contaminants such as chlorides, etc.
3. The abrasive and blast cleaning shall be adjusted to ensure that the minimum amount of abrasive remains embedded in the steel.
4. Blast cleaning shall not be done when there is dew on the metal or in the case of nozzle blasting, when the atmospheric humidity is such that moisture condenses at the nozzle during work.
5. Blasted surfaces shall be brushed or cleaned by vacuum before painting. It is essential to apply the primary coat within the shortest possible time after blasting and certainly within four (4) hours.

PMA 3.3 PAINTING

PMA 3.3.1 General

The ideal temperature for painting lies within the range 13 to 32 °C (55 to 90 °F). The steel surface should be clean and dry and the ambient relative humidity below 90 %. Painting should be suspended under the following conditions:

(a) When the temperature of the ambient atmosphere falls below 4 °C (40 °F), or its relative humidity rises above 90 %. (It may be possible to paint satisfactorily outside under these conditions by erecting some form of temporary shelter).

(b) For outdoor work, during periods of inclement weather, i.e. rain, snow, fog or mist.

(c) Generally when the conditions are such that condensation has occurred or is likely to occur on the steel.

Because of the possibility of condensation when cold material that is brought into a warm shop for painting after having stood in the open, ample time should be given to reach the ambient temperature, e.g. stand in the shop overnight before work is begun.

PMA 3.3.2 **Preparing Paint For Use**

Correct preparation of paint immediately before use is highly important.

All paints should be supplied from the stores and the painters, ready for application (with the exception of mixing). Any instructions given on the containers by the manufacturers should be strictly followed for example, any paint not used within its specified "pot life", should be discarded. No paint should be used after the expiry of the safe "shelf life" indicated on the container. The quantity of paint mixed at one time should be restricted according to its "pot life".

All paints should be thoroughly mixed under the supervision of the foreman in a manner approved by the project engineer. During the progress of the work, only the minimum number of containers needed should be open at any one time and partly full containers should be temporary sealed.

PMA 3.3.3 **Paint Application**

A zinc rich (epoxy) primer conforming to SANS 926, must be applied within four (4) hours after blast cleaning, to a dry film thickness of at least 15 microns. It is preferable that the primer be applied by brush.

After fabrication a coat of zinc-chromate or similar undercoat, shall be applied, as described in the detailed specification. Prior to applying this coat, the painter shall ensure that the entire surface is free of contamination.

Final coats shall conform to the detailed specification set-out hereunder.

When painting over blast cleaned surfaces which are unavoidably rough, it is essential that sufficient thickness of priming paint be applied to ensure that the high spots of steel surface are adequately covered. Should inspection reveal that this is not the case, the number of priming coats should be increased accordingly.

Each coat should be allowed to become sufficiently cured before the next is applied. Unduly long curing periods may impair adhesion between successive coats and the interval between successive coats should not exceed two (2) days.

If the curing interval has been so long as to endanger the adhesion of the following coat, the paint already applied should be lightly rubbed down with fine abrasive paper before applying the next coat.

PMA 3.4 **DETAIL PAINT SPECIFICATION**

A. **Ordinary steelwork**

Primers:	One coat zinc-chromate plus one coat universal undercoat
Finishing coats:	Two coats gloss enamel of approved manufacture

Total film thickness 0,1 mm

B. **Steelwork in sea environment**

Primer:	One coat zinc rich epoxy primer with dry film thickness of 15 microns
Undercoat:	One zinc-chromate
Finishing coats:	Two coats micaeous iron oxide structural paint of different colours to a total film thickness of 38 microns per coat

C. **Steelwork in contact with water**

Primers:	One coat zinc-chromate plus one coat red-lead undercoat

Undercoat:	Two coats "Chemgard" undercoat or similar of different colours (Plascon ref no A.R.1)
Finishing coats:	Two coats "Chemgard" enamel or similar (Plascon ref no A.R.6) with topcoat light grey, unless otherwise specified

Film thickness of all "Chemgard" coats to be at least 25 microns.

D. **Galvanised steel**

All traces of protective coatings must be removed with an approved cleaning agent.

Primer:	One coat of approved galvanising etching agent
Undercoat:	One coat universal undercoat
Finishing coat:	Two coats approved gloss enamel

E. **Cast iron**

Remove as much as possible of the bitumen covering layer.

Primer:	One coat aluminium-based paint
Undercoat:	One coat universal undercoat
Finishing coat:	Two coats approved gloss enamel

F. **Aluminium**

Primer:	One coat of approved etching agent
Further coats:	As D. and E. above

G. **PVC**

Primer:	One coat of approved etching agent
Further coats:	As D. and E. above

PMA 3.5 **GALVANISING**

1. **Surface treatment**

The surface must be completely free from rust, dirt, grease, mill scale and any other contaminants and must in general be cleaned to the same standards laid down in clause PMA 3.2 of the specification.

Further cleaning must be carried out by acid pickling. As soon as the product to be galvanised has been sufficiently cleaned and rinsed, a coating of flux must be applied.

2. **Zinc coating**

When hot-dip galvanising, the composition of the steel, the zinc temperature and the immersion items, shall comply to the standards generally accepted for that type of item. A coating of at least 765 g/m^2 must be achieved.

PMA 3.6 **EPOXY COATING**

1. **Surface treatment**

The surface must be completely free from rust, dirt, grease, mill scale and any other contaminants and must in general be cleaned to the same standards laid down in clause PMA 3.2 of the specification.

2. **Epoxy coating**

Epoxy coating of piping shall be done to the manufacturers specification and shall be similar or equal to COPON EP 2300 or Ameron 385. The epoxy coats shall be applied in layers of 70 to 60 µm to form a total thickness of 350 µm.

PMA 3.7 **REPAIRS TO DAMAGED SURFACES**

Damage to any previous paint coats should be made good by recoating the affected areas in the same or in an equivalent manner to that originally specified. They should first be cleaned to bare metal if necessary and the edges of the undamaged paint should then be bevelled, and sand papered. The patches of new paint shall overlap the old paint by at least 20 mm.

SECTION 4 : ELECTRICAL EQUIPMENT

QUALITY SPECIFICATION

PMA 4.1 **GENERAL**

This specification covers the general items of equipment for electrical installations. All materials and installation of such materials shall comply with the following:

1. The latest edition of the "Code of Practice for Wiring of Premises" SANS 10142-1 by the SA Bureau of Standards.
2. The Occupational Health and Safety Act (Act 85 of 1993).
3. The Local Supply Authority's Regulations and Fire Insurance Regulations.
4. Any special conditions implied in this specification.

PMA 4.2 **MOTORS**

Motors shall comply with BS 5000 : Part 99 and dimensioned to SANS 948 and be suitable for 400/230 volt, 3 phase, 50 cycle A.C. supply and shall be continuously rated for operation at the required altitude. The anticipated number of starts per hour must be taken into consideration when determining the motor size.

The motor speed shall preferably not exceed 1 450 r.p.m. and should suit the speed of the plant offered.

The motors shall be of the approved squirrel cage type with a low starting current and whenever possible be directly coupled to the pumps either by horizontal or vertical spindles.

All motors shall have class B insulation and be of the totally enclosed fan cooled (TEFC) type, suitable to be used in wet environments. Submersible pump motors shall be protected against wet running due to seal failure by means of moisture probes.

Non submersible motors rated at 11 kW and higher shall be protected against overheating by thermistors embedded in the motor windings. These devices shall trip the power supply to the motor as soon as the temperature in the windings exceeds safe levels. This will apply to submersible motors of 30 kW and higher. The thermistor temperature rating must be rated at least 10 °C lower than the temperature rating of the motor insulation class.

Motors shall be able to start satisfactorily at a voltage of 10 % below nominal voltage, as measured immediately after the starter is switched on. Motors shall be run-up to full speed in the time given in Appendix E of BSS 587 with the voltage reduced to 10 % as above. Acceleration shall be smooth throughout the starting period with no signs of hesitation or "crawling".

The motors shall be provided with approved watertight cable glands to accommodate the cables to be supplied with the equipment.

On completion of the manufacturer's work all motors shall be subjected to routine and type tests in accordance with BS 2613 and test certificates shall be submitted for approval before delivery to site is undertaken. After installation at site the Contractor shall carry out, in the presence of the Engineer, the high voltage tests laid down in clause 33 of BS 2613.

Tenderers shall supply wiring diagrams and efficiency, power factors and starting current curves of the motors at the time of tendering.

PMA 4.3 **STARTERS**

Unless otherwise specified in the project specification all the starters or switches for starting the electric motors shall be so designed, or special equipment be provided, to limit the amount of current, when starting and accelerating to the current values set out below:

1 kW to 4 kW	Four times full load current
5 kW to 40 kW	Twice full load current
Over 40 kW	One and a half times full load current

Starters types will be specified in the project specification. Should the starter type or duty not be suitable for the application of the tendered equipment, a suitable starter must be offered as an alternative in Annexure C together with price implication and full particulars similar to that required in Part 7 : information sheets. All starters shall be provided with a circuit breaker with padlockable handle, ampére meter, six digit running hour meter, contactor(s) and current limiting devices in accordance with the motor starting requirements, separate motor overload protection relay with adjustable thermal trips and protection against single phasing, and the necessary protection equipment required by the heat sensing devices in the motor windings. In the case of thermistor relays it must be ensured that the thermistor resistance curve and the thermistor relay switching characteristic is compatible. It may be necessary to install fixed external resistances for the required sensitivity. Starters shall be rated for not less than 15 starts per hour and shall be installed each in a separate compartment with a door.

Starters where required by SABS 0142, e.g. for motors liable to flooding shall in addition be fitted with earth leakage protection. Earth leakage units must be purpose made similar to the EPC manufacture. Standard current monitor modules will not be acceptable. Level sensing devices used in the control of starters shall be supplied from a safety supply with a maximum output voltage of 24 V.

The starters shall have "start" and "stop" push buttons and shall be provided with flush mounted reset push buttons for the overload trips and winding over temperature protection. Pilot lights must be provided on the starter panel cover to indicate run (green) and all individual fault (red) conditions, such as overload, earth leakage, and over temperature. The motor "run" pilot light must be activated by the motor contactor. A lamp test push button shall be provided to illuminate all lights simultaneously. Starters used in conjunction with automatic starting and stopping control equipment, shall be fitted with a red mushroom head stop lock type emergency stop. This stop must also be operative in manual operation.

The motor circuit breaker (with auxiliary switches as required) shall disconnect all power and control connections to the motor served. It shall however be possible to test the control circuit without switching the motor (i.e. the motor circuit breaker off) by means of a selector switch inside the panel marked normal/test.

The control circuit voltage must be taken from the load side of the motor circuit breaker (normal position) and from the live side (test position) via this changeover switch. The test position must be interlocked with an auxiliary switch on the motor circuit breaker, that the test line will be disconnected when the motor circuit breaker is on. I.e it shall not be possible to start the motor with the motor circuit breaker on and the c/o facility in test.

Facilities must be provided in the factory to test starters and all protection equipment.

The starters shall be fitted with approved terminal boxes and glands of ample dimensions to suit the cables to be supplied with this equipment. Provision shall be made for easy access by means of doors to the starters for maintenance purposes.

An approved earth terminal shall be provided on the frame of each starter housing gear and provision shall be made for earthing each starter in accordance with the requirements of local regulations.

On completion of the manufacturer's works, the starters shall be subjected to the routine and type tests in accordance with clause 83-93 of BS 587 and test certificates shall be submitted for approval before delivery to site is undertaken.

Facilities must be available to test starters for providing protection against overload, single phasing, no voltage, winding over temperature and earth leakage (where applicable).

PMA 4.4 ELECTRONIC (SOFT) STARTERS

PMA 4.4.1 General

Soft starters must provide smooth acceleration during run up, reducing voltage drop current and torque peaks, by means of reduced voltage at start-up, which is increased to full value on an adjustable time ramp, with an adjustable maximum motor current limit.

They must be in accordance with the type(s) specified in the project specification and must conform to the following minimum requirements.

PMA 4.4.2 Application

Soft starters will in general be specified for purposes of torque control rather than current limit. The reduced voltage at start-up and degree of current limit (if specified) may reduce starting torque considerably. Tenderers must ensure that the starter and conditions specified, comply with the requirements of the driven machinery offered and should qualify their tender including financial implications, accordingly.

Any financial implication arising due to non-compliance with this stipulation, will be borne by the Tenderer.

The motor and starter combination must be carefully selected to ensure compatibility of the torque requirements and motor insulation class for the operating cycle and starter to prevent thermal tripping of the starter due to overheating of the motor (prolonged starting times).

PMA 4.4.3 Technical Characteristics

The following (minimum) requirements and facilities listed must be provided.

PMA 4.4.3.1 Technology

The unit must consist of a microprocessor-controlled control unit and a power unit with 3 banks of 2 thyristor modules back to back with protection devices and gamma firing angle control.

PMA 4.4.3.2 Climatic operating conditions

a) Ambient temperature: -10 °C to 35 °C

b) Humidity: 60 % at 35 °C without condensation

PMA 4.4.3.3 Standards

a) Vibration resistance: to IEC 68-2-6

b) Shock resistance: to IEC 68-2-27

c) Radio electrical interference: to IEC 801-3

PMA 4.4.3.4 Supply

400 V 3 phase -15 %, +10 % at 50 Hz.

PMA 4.4.3.5 Rating

The starter must be suitable for the continuous rated motor connected load plus 10 % and 12 starts per hour, for single motors (refer to 6.0 for multiple motor starting). This is a minimum requirement and the application as per 2.0 must be taken into account with the selection.

PMA 4.4.3.6 **Control functions**

a) Starting

i) Voltage ramp (starting acceleration) : Adjustable 1-30 seconds from a fixed threshold of 0,33 rated voltage.

ii) Current limit: Adjustable form 2-5 times motor rated current.

iii) Start voltage boost facility: Switch selectable full voltage starting for 100 ms.

b) Stopping (switch selectable)

i) Uncontrolled free wheel stop by switching of the supply to the motor.

ii) Controlled stop with voltage ramp (deceleration) : Adjustable 2-60 seconds.

c) Switch selectable automatic and manual fault reset.

d) Motor thermal protection by adjustment of the motor current setting.

PMA 4.4.3.7 **Protective features**

a) Starter short circuit protection by means of fast acting fuses or other approved (by manufacturer) method.

b) Self diagnostic internal fault check before starting.

c) Thermal

i) Protection of the starter against over-load and over-temperature shutting the unit down. Units fitted with a cooling fan must have a fan fail alarm.

ii) Protection of the motor against overload (slow, medium and fast overheating exceeding the motor thermal capacity) by setting the motor operating current. It must incorporate a thermal memory, taking into account previous starts, which will prevent a restart once the thermal capacity has been exceeded until the motor has cooled down sufficiently. This facility must remain operational even if the starter is bypassed once the motor is up to speed.

d) Voltage : Phase failure and phase imbalance must stop the motor.

PMA 4.4.3.8 **Status display (LED)**

a) Starting/stopping

b) Normal operation

c) Cooling down

d) Internal fault (starter)

e) Thermal fault (starter)

f) Overload (motor)

g) Phase failure

NOTE:

The status indication must be visible without opening the panel door (in case of panels with an inner and outer door such as weatherproof panels, this applies to the inner door only).

PMA 4.4.3.9 **Output relays**

a) Fault : (1 x N/O; 1 x N/C)

b) Overload : (1 x C/O)

c) End of starting : (1 x N/O)

NOTE:

These conditions must be displayed external to the enclosure in which the starter is mounted, by means of pilot lights.

PMA 4.4.4 **Cabinet Installation**

When installed in a general-purpose enclosure protection degree IP23, sufficient space must be provided around the starters to ensure adequate air flow in accordance with the manufacturers requirements. If sufficient cooling cannot be obtained by natural ventilation a fan(s) must be fitted. In case of IP54 enclosures an internal cooling fan must be fitted and adequate heat exchanging surfaces must be provided (calculation to be provided on request).

PMA 4.4.5 **Power Factor Equipment**

If power factor equipment has been specified in the project specification steps must be taken that the power factor correction equipment is never connected to the starter output terminals. I.e. in the case of individual motor correction, the motor must be directly connected to the main supply after run up and the starter output disconnected, by means of interlocked contactors, before the power factor equipment is switched into the motor circuit. In these cases motors must be provided with separate overload relays since the starter overload protection is then out of circuit. Note the starter thermal memory must be retained when the motor is disconnected, to be functional if the motor is restarted.

PMA 4.4.6 **Multiple Motor Starting**

Only if so specified in the project specification, may a single starter be used for cascade starting of several motors.

In such a case pairs of interlocked contactor sets must be used for each motor to first connect the motor to the starter, then after running up to connect the motor directly to the supply after which the sequence is repeated for the next motor.

Motors must each be provided with separate motor overload protection relays. The starter rating and thermal capacity must be sufficient for the expected total number of starts per hour of the combined number of motors and must be clearly qualified in the tender, if not specified in the project specification.

Failure of any one drive (tripping or switched off) must not affect the starting of any of the other drives connected to the starter.

External (to the enclosure in which the starter is mounted) status indication for the drive status (start or run) must be provided for each drive via its start and run contactors by means of indication lights on the enclosure door (inner door in the case of weatherproof enclosures).

PMA 4.5 **CONTACTORS**

All contactors shall have easily removable contacts and coils such as Klockner Moeller, Sprecher & Shuh or equal and approved and rated if AC 3 for normal motor starting.

All contactors shall have adequately rated coils and continuously rated coils with a drop-off value of not more than 80 % of rated voltage.

PMA 4.6 **SWITCHGEAR**

All switchgear shall be rated for the maximum rupturing capacity of the particular system, as specified in the projection specification, but not less than 10 kA, unless otherwise specified in the projection specification.

1. **Circuit breakers**

   All circuit breakers shall be of the moulded case type, unless otherwise specified in the project specification, conforming to the SANS 156 specification as amended and carry the SANS mark. They shall be equipped with thermal or hydraulic devices for tripping on over currents and magnetic devices for instantaneous tripping on fault currents.

The minimum voltage rating for single and double pole circuit breakers shall be 250 V and 440 V for three-pole. The ampere rating and fault rupturing capacity shall be as specified or shown on the drawings.

2. **Miniature isolators**

Miniature isolators shall be micro-gap type manually operated air break switches, suitable for flush mounting and shall be to SABS 152. Where individually mounted they shall be in galvanised steel boxes with brass dished cover plates finished to match switch cover plates.

3. **Fused switches**

The fuse switch units shall be of the three phase and neutral arrangement having double break moving contacts supporting H.R.C. fuses, all housed in robust metal toggle mechanism. Interlocks shall be provided to ensure that the covers cannot be opened when the switch is in the closed position.

The fuses shall be of the H.R.C. type and shall comply fully with BS 88 category of duty A.C. 4.

A set of spare fuses of each rating used in the switchboards shall be supplied and handed to the representative at the site, who will issue a receipt.

PMA 4.7 **METERING AND INDICATION EQUIPMENT**

1. **kWh meters**

The meters shall be individually tested.

Test certificates shall be supplied with each meter. The scale shall be of the cyclometer type and definition down to $^{1}/_{10^{th}}$ of a unit shall be provided for.

2. **Maximum demand ammeters**

Moving iron ammeters suitable for 5 amp secondary current transformers shall be used.

Ammeters shall indicate the instantaneous current and have a separate indication for a 15 minute average value, preferably of a bimetal element type.

The scale shall be clearly calibrated in black on white background and both instantaneous and maximum demand readings shall be on concentric scales by means of different coloured pointers.

Meters shall be over-scaled with a suppressed over range corresponding to the starting current and where current transformers are used, the ratio of such transformers shall preferably be indicated on the ammeter fascia.

3. **Voltmeters**

The instrument shall be a moving iron type, suitable for horizontal, as well as vertical flush mounting.

The scale shall be clearly calibrated in black on a white background.

Calibration shall be up to 120 % of rated voltage and a suppressed scale at the zero reading shall be preferable.

The instrument shall comply with BSS 89 and shall have an industrial grade accuracy.

4. **Voltmeter switches**

Voltmeter switches shall have one "OFF" and six measuring positions and shall be suitable for panel mounting in such a way that only the handle and labelling plate extends to the front of the panel.

The fascia inscriptions on the labelling plate shall be clearly marked.

The switch terminals shall be suitable for lug connection and shall be clearly marked.

The contact movement shall have a roller or wiping action.

The voltage rating shall be suited to the installation.

5. **Voltmeter fuses**

The fuse base shall have a voltage rating suited to the particular installation and shall be suitable for either flush or projection mounting.

Cartridge type fuses shall be used with nominal rating of 2 amp at 380 volts 50 Hz and a rupturing capacity of 20 000 amps.

6. **Current transformers**

Current transformers shall be of the air-cooled type and shall have mounting facilities.

Split core current transformers shall not be acceptable.

The voltage rating shall be suited to the particular installation.

Current transformers shall have a class C accuracy and shall comply with BSS 81 and shall be suitable for a 10 V.A. secondary load.

PMA 4.8 **SWITCHBOARDS AND CONTROL BOARDS**

The switchboard shall consist of a cabinet of folded sheet steel not less than 1,6 mm thick, with panels of sheet steel mounted therein and with the required switchgear mounted on the panels. 3-CR12 sheet steel shall be used for switchboards used externally. Switchboards shall be rated to a protection degree of IP54 for external use and IP44 for use inside buildings. Switchgear shall be flush mounted with removable front panels and hinged doors. Switchboards for external use must have rubber gaskets fitted both for the internal and external doors, to prevent ingress of dust and sand. **The door construction must provide a continuous sealing edge against the gasket**. Cut outs for overlapping doors or locks will not be permitted. Coin slot type screws shall be used for securing the front panels and doors must be removable. The switchboard shall be arranged for front access to live parts as it will be placed against the wall.

The switchboard shall be floor or wall mounted and shall have a totally enclosed air insulated busbar chamber running the length of the main switch panel.

Painting shall be in accordance with section 3 on painting and the final coat shall be light grey baked enamel or finished in baked powder epoxy. Free standing external switchboards for pump stations shall be olive green.

The electrical equipment to be provided on the switchboard shall comply with the detailed requirements. The busbars shall be rated at 155 amps per square centimetre.

Internal busbars, of solid copper of each phase and neutral, wiring and terminals shall be of suitable size and rating and terminals shall be of brass and comply with sections 3.14.2 and 3.14.3 of SANS 152. Busbars must be solidly mounted on insulting supports with bolted lug connections to conductors. Screw type connections with clamps shall be acceptable for conductors up to and including 10 mm^2.

The wiring is to be installed by means of neatly arranged vertical and horizontal runs and laced together by means of "Helen Strap" or equal material. All control wiring and terminals shall be numbered with approved wire and terminal markers.

Wire looms shall be strapped to rails, secured to the steelwork. Self adhesive type securing material shall not be accepted.

Each distribution board is to be provided with neutral and earth busbar of solid brass with one way for each circuit and for each conductor.

All equipment on distribution boards are to be clearly labelled by means of plastic engraved labels.

Labels must be fixed to the boards immediately below the equipment by means of screws or channelling.

Drawings of all boards shall be **submitted for approval before** commencing

manufacture.

The grouping of equipment on panels will be logical and neat and shall be done on the following basis:

1. Main incoming breaker, main metering and incoming cable access.
2. Each motor circuit with sub-main breakers, starter, contactors and sub-circuit indication and metering.
3. Plant room auxiliaries and general control circuits.

Kiosk type outdoor switchboards for sewage pump stations may not be installed over the access opening to the sump so that the panel encloses the opening. The panel must be installed on a plinth in accordance with the detail drawing so that any sewage gas from the cable opening is vented to the atmosphere.

PMA 4.9 **CABLES**

Cables for general use shall be 600/1 000 V grade polyvinyl chloride (PVC) insulated steel wire armoured and PVC served overall.

All cables which might be submerged shall be of a similar standard to the VIRTRS 660 volt grade submersible power cable.

Tenderers are required to state in the schedule of prices the sizes of the cable between the various units to be supplied under this contract. The current ratings of PVC cables shall be in accordance with SANS 10142-1.

The Contractor will be responsible for measuring on his final layout plan for the installation, the lengths of the different cables required. The tender price must include for the supply and installation of all the necessary cables.

No cable joints will be permissible within the plant room.

PMA 4.10 **CABLE AND EARTH CONNECTIONS**

The Contractor is required to supply, lay, fix in position and properly connect all the cables between the circuit breakers and starting equipment on the switchboard and motors as automatic control equipment, as required.

Cables, where required, are to be fixed to walls on a galvanised steel cable rack or by means of shaped galvanised saddles or hardwood cleats so that the cables are not damaged in any way. Saddling or support spacing shall be such that the cables are kept straight without sagging, but the spacing shall not exceed 750 mm.

A 50 mm minimum diam steel sleeve pipe must be cast into the floor for a cable connection to equipment away from the floor. The end of the sleeve must be bent upwards in position of the equipment to be connected.

Care must be taken during the laying and installation of cables that the outer covering is not damaged and where any damage does occur, it shall be made good.

No cables shall be bent in laying to a radius less than 12 times its outside diameter.

All cable ends are to be properly made by workman skilled in this type of work. Cable glands for external terminations or inside pump houses shall have a compression type outer sheath seal.

PRATLEY or CCG weatherproof cable connection boxes shall be used as cable junction boxes above ground level. If the number of cables does not permit this weatherproof polycarbonate or galvanised steel enclosures of approved design equipped with fixed terminal strips will be used.

The Contractor is required to lay and properly connect the earth conductors between the motors, starters, switchboards and the earth mat.

All wiring and earthing arrangements shall comply with the requirements of SANS 10142-1 and also with the requirements of the local authority.

All cables crossing the floor and on the wall below a level of 450 mm above the floor, shall be protected by a robust cable covering of approved design.

PMA 4.11 **EARTHING**

All starters, motors, pumps and associated equipment must be earthed by means of a separate bare copper stranded earth conductor, connected to the earth bar of the relevant switchboard serving that equipment.

Earth conductors must be run alongside and strapped to its associated cable, equal in size to the cable conductors, with a minimum of 6 mm^2 and maximum of 70 mm^2. At the ends it must be fitted with sweated or crimped lugs, solidly bolted to the equipment to be earthed and the earth bar.

If there is a spare core in a cable, this may be used as an earth conductor instead of the separate bare copper earth conductor, as specified above.

Wire armouring of cables shall not be used as an earth conductor but must nevertheless be earthed.

A suitable earth mat must be supplied at each switchboard, connected with a 70 mm^2 earth conductor, marked "earth mat" to the switchboard earth bar. If possible, the earthing system must be bonded to the water reticulation system at least once, preferably at the main switchboard.

PMA 4.12 **DRAWINGS AND INSTRUCTION BOOKS**

Within three (3) weeks after receiving written acceptance of the tender, the Contractor shall supply the following information in duplicate:

1. Plant room layout drawings showing the main items of equipment, as well as all cable and wiring diagrams.
2. Switchboard and control board outline and equipment layout drawings and details of manufacturing.
3. Single line and wiring diagrams detailing all control metering and indication circuits inclusive of a description of circuit operation.

NOTE:

Drawings must be neat and clearly legible. Circuit diagrams must be done on a grid system with elements of control equipment referred to applicable (grid) line numbers in a schedule directly below the relevant control device.

The function of each control element must be clearly stated on the drawings.

SECTION 5 : GUARANTEE AND TESTING

PMA 5.1 **GUARANTEE**

The Contractor shall submit the following characteristic curves for the performance of the plant:

Pumps

1. Head quantity curve
2. Efficiency curve
3. Kilowatt curve

Motors

1. Efficiency curve
2. Power factor curve

The Tenderer is to state in his tender the percentage tolerances within which he is prepared to guarantee:

(a) The rate of delivery at the specified duty head;

(b) The pump efficiency at the specified duty;

(c) The head quantity curve.

The Employer shall have the right to refuse acceptance of a pumping set which, under test in terms of clauses set out below, fails to deliver the specified duty discharge at the specified duty head. If the manufacturer specifies any tolerance in the delivery of the pump, the Tenderer must make due allowance for this in his design.

In the event of such refusal of acceptance the Contractor will be afforded an opportunity to effect refinements or adjustments in order to overcome the deficiencies of the pump, failing the success of which he shall replace the pump with a new one, which will be subject to the same conditions in regard to tests and guarantees as herein specified. Pending such replacement or agreement as to delivery and use of the pump, in which case the Contractor shall deliver the pump and the Employer shall have the right to use and continue using it until it is replaced by a satisfactory new pump.

Any costs involved in any refinements, adjustment or replacement shall be at the Contractor's expense.

PMA 5.2 **TESTING ON SITE**

PMA 5.2.1 **Completion and Commissioning**

On completion of the erection of the installation the Contractor must commission the plant to ensure the plant operation complies with the specification and performance figures tendered.

The testing of the pumps shall be carried out strictly in accordance with BS 599 except insofar as may be amended or amplified by any other condition of this contract. During the testing of the pumping unit, careful records are to be kept of the power consumed, the power factor, the quantity delivered and the head against which the pump operates. The pumping head is to be determined from calibrated pressure gauges on the delivery and suction pipes. The power consumed is to be determined by a calibrated kilowatt-hour meter while the power factor is to be recorded by means of a suitable instrument. The quantity delivered is to be measured by displacement in the sump, or other suitable means.

From records kept, the capacity, efficiency and power input for the pumping unit shall be calculated to determine whether these are in compliance with the guaranteed figures submitted by the Contractor at the time of tendering.

An item has been included in the schedule to cover the cost of providing equipment, which must be adequately calibrated and standardised to carry out the test, as well as the cost of all labour necessary to complete the testing of the plant offered.

In the event of the Contractor being unable to test the pumps at the time of its installation through circumstances beyond his control, it may be necessary for him to return to the site at a later date to undertake this work. An item has been provided in the schedule to cover the cost of returning to site, if ordered to do so, in order to carry out the test.

The water and electric power required for the tests will be supplied free of charge by the Employer.

The following electrical tests must be carried out on the installation by the Contractor or a competent person appointed by him:

(a) **Before commissioning**

1. Insulation test;
2. Continuity test;
3. Test for correct direction applied to every motor;

(e) 4. Prove the correct connection and rotation of any energy meters;

5. Settings of all overload and other adjustable protective devices shall be set to the requirements of the equipment.

(b) **At commissioning**

6. Motor currents using instruments of which the errors, if any, have been established;
7. Speed of rotation;
8. Control of the equipment;

The commissioning results, both mechanical and electrical, must be submitted to the Engineer for scrutiny, before he is called out for the site acceptance testing. Commissioning test reports must be obtained from the Engineer for this purpose. A form F37 relating to the electrical installation in terms of the Occupational Health and Safety Act (Act 85 of 1993) must be submitted together with the test results.

PMA 5.2.2 **Acceptance Testing**

On completion of commissioning of the plant, and submission of the test results for evaluation by the Engineer, the Contractor will be required to make suitable arrangements for the testing of the plant and equipment supplied under this contract in the presence of the Engineer or his representative and any or all of the test results must be demonstrated to the Engineer at his request.

PMA 5.3 **TESTING INSTRUMENTS**

The Contractor must provide all test instruments. They must be of a high quality and calibrated yearly by an approved calibration authority. The calibration certificates must be presented on request.

Note that should the plant not be accepted at this acceptance test due to inadequate commissioning, non-compliance with the specification or guaranteed performance figures, requiring a return visit, the full cost of the Engineer and the Contractor for this re-inspection, will be for the account of the Contractor.

SECTION 6 : PUMPS AND ACCESSORIES

PMA 6.1 TYPE OF PUMPS

Pumps shall be directly coupled by means of flexible couplings of approved manufacture, unless specified otherwise in the project specification.

Pumps shall be of manufacturer's standard and approved design, capable of doing the duty required at a speed as specified in the project specification and shall be so balanced that there will be no undue residual thrust when the pump is new of after wear has taken place and suitable thrust bearings must be provided to take residual thrust. Pumps shall be selected to suit the static suction lift or positive suction head, the static discharge head, the total head, the liquid handled and the net positive suction head available and shall be of single or multi-stage design with or without seal flushing and balance piping as may be required for the specific project. Pump casings are to be of high-grade cast-iron or other approved material, rigidly secured to a neat, properly designed bedplate or base. The pump casing shall be selected on the basis of the above-mentioned criteria and taking into consideration the site conditions. Impellers and guides shall be of bronze or other suitable metal selected for the medium to be handled - the diameter being sufficient to withstand and transmit without slip and with ample margin of safety to all torsional and bending stresses to which it may be subjected. Bearings are to be of ample bearing area, dust-proof with suitable provision for continuous lubrication.

The pumps offered are preferably to be of the self-regulating type, the kW characteristic curve being such that with an increase in rate of delivery beyond a certain figure, the kW shall decrease thereby ensuring that the motor shall not be overloaded in the event of a large reduction in pumping head, due to a burst occurring in the pumping main or any other such contingency. Performance particulars and characteristic curves shall be submitted with tenders.

PMA 6.2 PUMP EQUIPMENT AND SPARES

The pumps are to be fitted with all the necessary air-cocks, and are to be provided with automatic air release equipment if necessary, including all pipe-work. The pumps shall be fitted with drains, which shall discharge into pipes leading to the outside of the building as shown on the drawings. All drains and air-release pipes shall be either copper or galvanised steel and shall be properly supported along their entire length.

Each pump is to be provided with highest quality 100 mm dial pressure gauges calibrated in kPa to register the suction and delivery pressures. Such gauges shall be in accordance with BS 1780, Table 1, with bottom connection for direct mounting. The suction gauges shall cover a range from zero to minus 5 metres and from zero to plus 5 metres. The delivery gauges shall cover a range from zero to at least 10 per cent in excess of the maximum head that can be developed by the pump. Calibration certificates for all gauges must be supplied by the Contractor. All the gauges shall be fitted with shut off valves.

Complete sets of spanners, keys and tools required for operation and overhauling, and adjustment of the pumps are also to be supplied with a lock-up wall-mounted cupboard, mounted in a convenient position in the pump house. A separate item is included in the schedule of prices for the supply of all spare pump and motor parts which are not regularly kept in stock by the Contractor and which he considers to be necessary for the replacement of wearing parts, a complete list of which is to be submitted with tenders.

PMA 6.3 LUBRICATION

Efficient means of lubrication shall be provided for all bearings with provision for grease lubrication, full details of which shall be submitted at the time of tendering.

PMA 6.4 SHAFT SEALING

The method of sealing, that is gland packing or mechanical seals, shall be selected taking cognisance of the site conditions and pressures and is to be clearly stated at the time of tendering. Any pressure required for sealing glands or flushing casings, must be stated in detail in the relevant data sheet or in a covering letter.

PMA 6.5 **BEDPLATES**

Each pump and motor is to be mounted on a bedplate of rigid construction, provided with suitable openings for pouring in grout and all necessary holding down bolts for securing to the foundations which will be constructed under another contract to the dimensions and details to be supplied by the Contractor under this contract. Concrete work to the foundations will be finished off to approximately 25 mm below the underside of the bedplate, and in erecting the pumps and motors the Contractor shall arrange for the setting of each unit to exact line and level by means of steel wedges, and shall thereafter grout up the bedplates and finish off the foundations around them with chamfered or rounded edges.

PMA 6.6 **PIPE-WORK**

Tenders under this contract are to include for the supply, delivery and erection of all the necessary suction and delivery pipework, guide bars and discharge connections in order to complete the installation as shown on the relevant drawings. Tenderers should note, however, that they should adhere to the floor area as shown, unless they find it imperative to increase the size.

Each suction branch shall be provided with a sluice valve. Each delivery branch shall be provided with a gunmetal faced reflux valve and sluice valve. Bends and branches shall provide streamlined flow conditions and the layout of the pipework shall be such as to facilitate dismantling and inspection. The pipes are to be properly supported and so arranged that all stress created in the pipeline being static or dynamic forces, including recoil shock, will be taken up by suitable anchors. Tenderers are to note on the drawing that piping passing through concrete work is to be provided with puddle flanges and that certain reducers are to be manufactured with flat tops.

The prices tendered for pipework shall include for bolting up flanged ends and assembling flexible couplings in position.

Tenderers are required to submit a pipe schedule of the pipework offered with their tenders, and if an alternative pipe-work layout is proposed, a detail drawing of the pipe-work arrangement must be supplied with the tender.

SECTION 7 : DIESEL/ALTERNATOR GENERATING SETS

PMA 7.1 GENERAL

This section covers the Particular Specification for the supply, delivery and complete installation on site in full working order of diesel/alternator generating sets. These sets are used either for the base load or standby.

Any deviation from this Particular Specification or additional information will be given in the Scope of Works in this document.

Full particulars, performance curves and illustrations of the equipment offered, shall be submitted with the Tender. Tenderers may quote for their standard equipment, complying as closely as possible with this specification, but any deviations from the Specification shall be fully detailed.

The Information Sheets in Part C2 shall be completed in all respects.

PMA 7.2 DELIVERY

The Employer will provide a plant room with a floor area with dimensions as shown on the drawings.

Tenderers shall confirm that the space is sufficient for the installation of the generating set and the control board and shall indicate the proposed layout of their equipment on the drawings in red ink.

The Contractor shall inform the Engineer when the set is ready for installation.

Delivery shall be affected after confirmation by the Engineer that the site is ready for installation.

PMA 7.3 OUTPUT AND VOLTAGE

The set shall have a site output and voltage as specified in the Scope of Works of this document.

PMA 7.4 CONSTRUCTION

The engine and alternator of the set shall be built together on a common frame, which shall be mounted on a skid base on antivibration mountings. The set shall be placed directly on the concrete floor of the power room. A drip tray must be fitted under the engine. The tray shall be large enough to catch a drip from any part of the engine.

The Frame must be of the “DUPLEX” type.

PMA 7.5 OPERATION

PMA 7.5.1 Standby Set

The set is required to supply the lighting and power requirements in the case of a mains supply failure.

The set shall be fully automatic i.e. it shall start when any one phase of the main supply fails 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 shall be switched off and the start failure relay on the switchboard shall 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 appropriate switchboard.

Important note

The Tenderer shall submit, together with his offer, the design of the control system to comply with the requirements for automatic starting, stopping, interlocking and isolation as specified.

PMA 7.6 **ENGINE**

PMA 7.6.1 **General**

The engine shall comply with the requirements laid down in BSS 5514 and shall be of the atomized injection, compression ignition type, running at a speed not exceeding 1500 r.p.m. The engine shall 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 shall be guaranteed by the Tenderer.

Turbo-charged engines will only be accepted if the Tenderer submitted a written guarantee that the engine can deliver full load within the specified starting period.

Curves furnished by the engine manufacturers, showing the output of the engine offered against the speed, for both intermittent and continuous operation as well as fuel consumption curves when the engine is used for electric generation, shall be submitted with the tender.

PMA 7.6.2 **Rating**

PMA 7.6.2.1 **Standby Set**

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.

PMA 7.6.3 **Derating**

The engine shall be derated for the site conditions as set out in the Scope of Works.

The derating of the engine for site conditions shall be strictly in accordance with BSS 5514. Any other methods of derating shall have the approval of the Engineer and shall be motivated in detail. Such derating shall be guaranteed in writing and proved by the Contractor at the site test.

PMA 7.6.4 **Starting and Stopping**

The engine shall be fitted with an electric starter motor and shall be easily started from cold, without the use of any special ignition devices, under summer as well as winter conditions, against full load.

Tenderers shall state what arrangements are provided to ensure easy starting in cold weather. Full details of this equipment shall 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 shall be protected by a suitable circuit breaker.

PMA 7.6. **Starter Battery**

The set shall be supplied with a fully charged lead-acid type battery, complete with the necessary electrolyte. The battery shall have sufficient capacity to provide the starting torque stipulated by the engine manufacturers. 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. The battery shall be of the heavy-duty low maintenance type, housed in a suitable battery box and shall be guaranteed for not less than two years when used for one start per day.

PMA 7.6.6 **Cooling**

The engine shall be air-cooled with water-cooled types offered only as an alternative. In the case of water-cooling, a built-on heavy duty, tropical type pressurised radiator shall 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 shall give a visual and audible indication on the switchboard. All air ducts for the cooling of the engine are to be allowed for. The air shall not re-circulate in the plantroom and an air duct shall be supplied from the radiator face to the air extraction fan in the plantroom wall.

PMA 7.6.7 **Lubrication**

Lubrication of the main bearings and other important moving parts shall be by forced feed system. An automatic low oil pressure cut-out shall be fitted, operating the stop solenoid on the engine and giving a visible and audible indication on the switchboard.

PMA 7.6.8 **Fuel Pump**

The fuel injection equipment shall be suitable for operation with the commercial brands of diesel fuel normally available in South Africa.

PMA 7.6.9 **Fuel Tank**

A fuel tank shall be installed for each set in the plant room. The tank shall have sufficient capacity for standby sets to run the engine on full load for a period of 24 hours. Base load sets shall have a minimum capacity of 250 litres.

A water trap shall be fitted in the fuel pipeline from the tank to the engine.

The tank shall be fitted with a suitable filter, a full height gauge glass and a ”low fuel level” alarm, giving an audible and visible signal on the switchboard.

A manually operated pump with sufficient length of oil resistant hose to reach 2 m beyond the door, shall be supplied, for each set or pair of sets for filling the fuel tank/s from 200 litre drums.

For sets rated at more than 70 kVA an electrically operated pump with a suitable length of oil resistant hose shall be supplied, for filling the fuel tank from 200 litre drums.

PMA 7.6.10 **Governor**

The speed of the engine shall be controlled by a governor in accordance with class A2 of BSS 5514 if not otherwise specified in the Scope of Works. When full load is suddenly switched off or on, the temporary speed variation shall not exceed 10%. The permanent speed variation shall not exceed 4½% of the nominal engine speed. External facilities shall be provided on the engine, to adjust the nominal speed setting.

PMA 7.6.11 **Flywheel**

A suitable flywheel shall be fitted, so that lights fed from the set will be free from any visible flicker.

The cyclic irregularity of the set shall be within the limit laid down in BS 5514.

PMA 7.6.12 **Exhaust Silencer**

It is essential to keep the noise level as low as possible. An effective exhaust silencing system of the residential type shall be provided to reduce exhaust noise to 75 dBA.

The exhaust pipe shall be installed in such a way that the expulsed 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 to reduce the heat and noise transmission into the plantroom and shall be protected against the ingress of driving rain at 45° to the horizontal.

PMA 7.6.13 **Accessories**

The engine shall be supplied complete with all accessories, air filters, standard sets of tools, 3 instruction manuals, spare parts lists, etc.

PMA 7.7 **ALTERNATOR**

The alternator shall be of the self-excited brushless type, with enclosed ventilated drip-proof housing and shall be capable of supplying the above specified output continuously with a temperature rise not exceeding the limits laid down in BS 2613 for rotor and stator windings with Class E insulation.

Both winding shall be fully impregnated for tropical climate and shall have an oil resistant finishing varnish.

PMS 7.7.1 **Regulation**

The alternator shall be self-regulated, the inherent voltage regulation not exceeding plus or minus 2½% of the nominal voltage specified above, at all loads with the power factor between unity and 0,8 and within the driving speed variations of 4½% between no-load and full load.

PMA 7.7.2 **Performance**

The excitation system shall be designed to promote rapid voltage recovery following the sudden application of the full load. The voltage shall recover to within 2½% of the steady state within 300 milli-seconds following the application of full load and the transient voltage dip shall not exceed 15%.

PMA 7.7.3 **Coupling**

The engine and alternator shall be directly coupled by means of a high-quality flexible coupling, equal and similar to the “HOLSET” type.

PMA 7.8 **SWITCHBOARD**

A switchboard must be supplied and installed to incorporate the equipment for the control and protection of the generating set and battery charging. In case of base load sets, an individual switchboard must be supplied for each of the two sets.

The switchboard for both base load and standby sets shall conform to the specification as set out in the following paragraphs. Differences between the two types will be dealt with individually.

PMA 7.8.1 **Construction**

The switchboard shall be a totally enclosed, floor mounted unit, of steel panels, carried on a substantial angle iron framework.

The board shall be flush fronted, all equipment to be mounted at the back of the front plate on suitable supports.

All equipment, connections and terminals shall be easily accessible. 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 lumes.

The steelwork of the board shall be thoroughly de-rusted, primed with zinc chromate and finished with two coats of quality grey enamel, or a baked powder epoxy coating.

Suitably rated terminals shall be provided for all main circuits and for the control and protection circuits. Where cable lugs are used, these shall be crimped onto the 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 the numbering of these markers shall be shown on the wiring diagram of switchboards. Control wiring shall be run in PVC trunking as far as possible. The trunking shall be properly fixed to the switchboard steelwork. Adhesives shall not be acceptable for the fixing of trunking or wire lumes to the steelwork.

The automatic control and protection equipment shall be mounted on a separate easily replaceable small panel with printed circuits. The equipment shall mainly be the “solid state” type. After mounting the equipment on the panel, the rear of this panel shall be sealed with epoxy-resin. However, other proven control systems may also be considered, but shall be described in detail.

All equipment on the switchboard, such as contactors, isolators, busbars etc., shall have ample current carrying capacity to handle the full load alternator current.

PMA 7.8.2 **Protection and Alarm Devices**

All switchboards shall be equipped with protection and alarm devices as described below.

a. Alternator

A two-pole circuit breaker and an adjustable current limiting protection relay shall be installed, for protection of the alternator. The protection relay shall be of the type with inverse time characteristics, equal and similar to “OMRON K2C5 – M80A”. The relay shall cause the contactor to isolate the alternator and stop the engine.

b. Engine

Protection shall be provided for high engine temperature, low lubricating oil pressure, over speed and start-failure (standby sets only).

Individual relays with re-set pushes are required, to give a visible signal and stop the engine when any of the protective devices operate. In the case of base-load sets and manual operation of standby sets, it shall not be possible to restart the engine by pushing the re-set.

The indicators and re-set pushes must be marked:

“OVERLOAD”

“TEMPERATURE HIGH”

“OIL PRESSURE LOW”

“OVERSPEED”

“START FAILURE”

In addition two relays with reset pushes shall be fitted giving an audible and visible signal, when:

a. the fuel oil level in the service tank is too low. The reset push of this relay is to be marked “FUEL LOW”.

b. the battery charger failed. The reset push of this relay is to be marked “CHARGER FAIL”.

The relays shall operate a communal warning red light, which shall be installed on top of the plant room.

The protection circuits and the red light shall be operated from the battery.

Potential free contacts from the alarm relay shall be brought down to terminals for remote indication of alarm conditions.

A pushbutton shall be installed in the warning light circuit, to cancel the warning light.

PMA 7.8.3 **Manual starting**

Each switchboard shall be equipped with two pushbuttons marked “START” and “STOP” for manual starting and stopping on the set.

PMA 7.8.4 **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.

a. Base-load sets

The charger shall be fed from the 231V outgoing side of the panel. However, an engine driven generator with automatic voltage regulator is also acceptable. This generator shall also be incorporated in the alarm system in case of failure, as described for the battery charger.

b. Standby sets

The battery must be fed from the mains and when the mains is off, from the 231V outgoing side of the panel.

PMA 7.8.5 **Switchboard instruments**

Each generating set shall have the switchboard equipped as follows:

a. One flush 96 mm square dial voltmeter, reading the alternator voltage, scaled as follows:

   i 0-300V for single phase generators.

   ii 0-400V for three phase generators. In this case a six position and off selector switch shall be installed for reading all phase to phase and phase to neutral voltages.

b. A flush 96 mm square dial maximum demand ampere meter for each phase, with resettable pointer suitably scaled 20% higher than the alternator rating. A red arc stripe above the scale markings from 0-20A and a red radial line through the scale at full-load current shall be provided. This instrument shall be supplied complete with the necessary current transformer.

c. One flush 96 mm 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 is to read 1/10th hour.

e. Fuses or m.c.b.’s for the potential circuits of the meters.

f. One flush 96 mm square dial ampere meter suitably scaled for the battery charging current.

g. One flush 96 mm square dial voltmeter with a spring-loaded push-button or switch for the battery voltage.

PMA 7.8.6 **Markings**

All labels, markings or instructions on the switchgear shall be in English.

PMA 7.8.7 **Earthing**

An earth bar shall be fitted in the switchboard, to which all non-current carrying metal parts shall be bonded.

The neutral point of the alternator shall be solidly connected to this bar by means of a removable link labelled “EARTH”. Suitable terminals shall be provided on the earth bar for connection of up to three earth conductors.

In case of base-load sets the earth bars of the two switchboards shall be solidly connected.

PMA 7.8.9 **Standby Sets**

The equipment described in this paragraph shall be fitted to switchboards for standby sets only.

PMA 7.8.9.1 **Operation selector switch**

A four-position selector switch shall be provided on the switchboard, marked “AUTO”, “MANUAL”, “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 shall 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 “STOP”, the set shall be completely disconnected from the automatic controls, for cleaning and maintenance of the engine.

PMA 7.8.9.2 **Automatic change over system**

A fully automatic changeover system shall 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 shall be interlocked in a safe and fail-proof way to prevent the alternator being switched onto the mains or vice versa.

PMA 7.8.9.3 **Bypass switch and mains isolator**

The switchboard shall be equipped with an on-load isolator to isolate the mains and manually operated on-load by-pass switch, which shall either connect the incoming mains to the automatic control gear or directly to the outgoing feeder. In the latter position the automatic control gear, including the main contactors, shall be isolated for maintenance purposes.

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.

The ratings of this equipment shall be specified in the Scope of Works.

PMA 7.8.9.4 **Start delay**

Starting shall be automatic in the event of a mains failure. A 0-15s adjustable, start delay timer shall be provided to prevent start-up on power dips or very short interruptions.

PMA 7.8.9.5 **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 that 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.

PMA 7.9 **CHANGE-OVER SWITCH FOR BASE-LOAD SETS**

A three position with centre position off, manual change-over switch shall be provided, which shall connect either set No. 1 or set No. 2 to the outgoing feeder cable to the distribution board (supplied by others) in the generating room.

This switch shall be mounted in a separate wall mounted steel enclosure in the generating room.

The enclosure shall comply with the relevant paragraphs of Clause PMA 4.8 of Section 4: Electrical Equipment with regards to construction and finish.

PMA 7.10 **INSTALLATION**

Except for the supply of the incoming mains supply cable and outgoing feeder cables, the Tenderer shall include for the complete installation and wiring of the plant in running order, including the connection of the incoming mains cable (standby sets only) and outgoing feeder cables. In the case of base load sets, provision shall be made for the connection only on the cable to the change-over switch.

For the alternator circuit PVC insulated steel wire armoured PVC sheathed cable shall be used. For the control circuits either multi-core PVC cable or PVC insulated wires in conduit may be used. The cable sizes shall be specified in the Scope of Works.

PMA 7.11 **WARNING NOTICES**

Notices, in English, shall be installed in the plant rooms in terms of Occupational Health and Safety Act.

The contractor shall consult the Act and get approval of the wording from the Department's representative, prior to ordering the notices.

Lettering must be black on a yellow background.

Notice shall be installed outside next to the entrance of the plant room and inside the plantroom, as stipulated in the Act.

PMA 7.11.1 **Warning Notices for Stand-by Sets**

In the plant room, a clearly legible and indelible warning notice shall be mounted in a conspicuous position.

The notice shall be made of a non-corrodible and non-deteriorating material, preferably plastic, and shall read as follows:

DANGER : This engine will start without notice. Turn selector switch on control board to "OFF" before working on the plant.

PMA 7.12 **Drawings**

The successful Contractor shall, as soon as possible after receipt of the order, submit detailed drawings and wiring diagrams of the plant and the switchgear. One diagram shall be contained in a metal pouch on the side of the switchboard.

PMA 7.13 **Information Required**

Tenderers shall furnish detailed descriptions and illustrations of the equipment offered and shall complete the applicable Information Sheets in Part C2. This includes drawings of the switchboard layouts and control diagrams.

Failure to submit any of the information asked for may disqualify the tender.

PMA 7.14 **Guarantee**

The Contractor shall guarantee the complete plant for a period of 12 months from the date it has been taken over by the Employer in running order.

If during this period the plant is not in working order, or not working satisfactorily owing to faulty material, design or workmanship, the Contractor will be notified and immediate steps shall be taken by him to rectify the defects and/or replace the affected parts on site, at his own expense.

PMA 7.15 **Maintenance**

PMA 7.15.1 **Initial Maintenance**

The Contractor will be required to maintain the plant in good running order for a period of twelve months after the plant has been taken over by the Employer. The full cost of this maintenance shall be included in the tender price, inclusive of overheads and travelling fees. Apart from the consumables as detailed below, the Employer shall not acknowledge any cost claims additional to this maintenance cost as tendered.

However should the Contractor fail to hand over the plant in good working order on expiry of the specified twelve months, the Contractor will be responsible for further monthly maintenance until final delivery is taken.

Under this agreement the Contractor will undertake to arrange once per month for a visit to the plant by a qualified member of this staff, who shall:

a. Report to the Officer-in-Charge, keeping the maintenance records, and enter into a log book the date of the visit, the tests carried out, the adjustments made and any further details that may be required.

b. Grease and oil moving parts where necessary.

c. Check the air filter and, when necessary, clean the filter and replace filter oil.

d. Check the lubricating oil and top-up when necessary.

e. After the plant has run on one oil change for the number of hours stipulated by the manufacturers, drain the sump and refill with fresh lubricating oil. The reading of the hour meter on the switchboard will be taken to establish the number of hours run by the plant.

Under this heading only the cost of the actual oil used, shall be charged as an extra on the monthly account.

f. Clean the lubricating oil filter and/or replace the filter element at intervals recommended by the engine manufacturer, the cost of a new filter element to be charged as an extra on the monthly account.

g. Check and when necessary adjust the valve settings and the fuel injection equipment.

h. Check the battery and top-up the electrolyte when necessary.

i. Test-run the plant for ½ hour and check the automatic starting with simulated faults on the mains, the proper working of all parts, including the electrical gear, the protective devices with fault indicators, the change-over equipment and the battery charger. Make the necessary adjustments.

j. Report to the Employer on any parts that become unserviceable through fair wear and tear, or damaged by causes beyond the control of the Contractor.

The Contractor shall immediately submit a detailed quotation for the repair or replacement of such parts to the Employer.

k. Advise the Employer when it has become necessary to decarbonise the engine and submit a quotation for this service.

PMA 7.15.2 **Maintenance Agreement**

a. After the lapse of this 12 months period, the Contractor may be required to enter into a maintenance agreement, as described under Clause PMA 7.15.1, initially for one year with a possible yearly renewal.

b. Acceptance of the tender shall not bind the Employer to accept this maintenance service.

c. Tenderers shall show on the Pricing Schedule, the monthly charge for carrying out the maintenance, as detailed above.

PMA 7.16 **Tests**

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 Employer may be present during the test to satisfy themselves that the generating set complies with the specification and delivers the specified output. The test shall be carried out in accordance with BSS 5514 Part 2 and 3.

b. At the site after completion of the installation, in accordance with the Scope of Works.

The resistance for the load and all instruments which may be required for the tests have to be provided by the Contractor.

Test reports of both tests as specified under (a) and (b) are to be submitted to the Employer.

SECTION 8 : MINIATURE SUBSTATIONS

PMA 8.1 SCOPE

This section provides for the supply, delivery, installation, connection and commissioning of miniature substations as specified.

The particulars relating to transformers and HV switches will also be applicable to separate transformers and HV switches.

PMA 8.2 INTERPRETATION

The specification describes in detail the requirements for miniature sub-stations.

PMA 8.3 MATERIALS

The substation shall be manufactured of sheet metal with welded joints. The unit shall be vermin-proof. The substation shall be of the following finish:

a. Rust resistant 3CR12 sheet metal shall be used for the manufacture of the enclosure.

b. Welding materials shall be of the same quality as the base metal.

c. After machining and before painting, all fat and grease shall be removed by using a suitable solvent.

d. The electrostatic epoxy powder process shall be used to obtain the final finish in “Avocado Green” in accordance with SANS 1091, Code C12.

Alternative finishes will be considered provided a full description of the process accompanies the tender.

PMA 8.4 CONSTRUCTION EQUIPMENT

PMA 8.4.1 High voltage compartment

Access to the high voltage compartment shall be through a set of double doors.

PMSA 8.4.1.1 High voltage switchgear

The equipment shall consist of an oil submerged ring main unit with a fused switch protecting the transformer. The ring main sections shall be rated for 350 MVA, 400A load break/fault make capacity, while the fused switch shall be suitable for 350 MVA at 11 kV with a continuous current rating of 85A. The unit shall comply with Specification B.E.B.S. S16.

The operation of the three panels shall be similar except for the trip facility on the fused unit.

PMA 8.4.1.2 Ring Main Isolators

a. Switching : Lockable ON/OFF/EARTH positions.

b. Mechanism : Spring operated hand control. The removable operating handle shall be used in separate positions for ON/OFF or OFF/EARTH switching. Access to these positions shall be controlled by spring operated lockable covers.

c. Interlocking : The unit shall be interlocked as follows:

(i) In the ON position to render the EARTH position inactive.

(ii) In the EARTH position until the TEST cover is locked.

d.	Current transformers	:	Nil
e.	Fault indication	:	Nil
f.	Cable end box	:	Two end boxes with solid brass connecting terminals, complete with compound and suitable for the cables in accordance with the project specification.

PMA 8.4.1.3 **Fused Switch**

a	Purpose	:	Transformer supply
b.	Identification	:	Transformer with kVA capacity as specified.
c.	Tripping	:	Any blown fuse shall trip all three phases.
d.	Interlocking	:	(i) To allow replacement of a fuse in the OFF position only (ii) Automatic lockout of the ON/OFF positions until a blown fuse has been replaced.
e.	Switching	:	Lockable ON/OFF/EARTH positions
f.	Mechanism	:	Hand controlled with ON/OFF/EARTH mechanism interlocking and tripping as per (c) and (d) above. When operating from OFF to ON the switch shall fully engage under fault switching where-after the fuse shall be completely blown before the switch trips and isolates.
g.	Fuses	:	HRC fuses shall be fitted in compliance with the manufacturer's recommendation for the protection of the transformer specified.

PMA 8.4.2 **Transformer**

The following applies to the transformer to be fitted to the unit.

a.	Specification	:	Shall carry the mark in accordance with SANS 780
b.	Type	:	See cooling
c.	Primary voltage	:	11000 Volt
d.	No-load secondary voltage	:	400/231 Volt
e.	Phases and frequency	:	3 – 50 Hz
f.	Vector group	:	Dyn 11
g.	HV tappings	:	0% ± 2,5% ± 5%
h.	Tap setting	:	External no load selector
i.	LV neutral	:	For solid earthing
j.	Efficiency	:	Low loss
k.	Oil level indicator	:	To be fitted
l.	Cooling	:	ONAN

PMA 8.4.3 **Low Voltage Compartment**

This compartment shall be capable of accommodating the following equipment.

Circuit breaker and current transformer ratings shall be in accordance with the Scope of Works.

Item		Description
Main circuit breaker	:	Triple pole, 15 kA moulded case with thermal overload and magnetic instantaneous protection.
Street lighting	:	3 x HRC fuse holders complete with bases, similar to English Electric type T Red Spot, with 30A HRC fuses. One 3-phase, 4 wire kWh energy meter suitable for 400/220 V and 0 – 50 Amp operation. One contactor with coil suitable for 220 Volt continuous operation and equipped with triple pole contacts suitable for switching 30 Amps. One HRC fuse holder complete with base and 4 Amp HRC fuse similar to above. The photo-electric switch is not provided as part of the substation. The terminals only shall be provided for connection of the unit. The panel shall be equipped with a single pole test switch. Three 20 Amp 5 kA single pole moulded case circuit breakers with thermal overload and instantaneous magnetic fault protection.
Low voltage feeders	:	Triple pole 15 kA moulded case circuit breakers with thermal overload and instantaneous magnetic fault protection.
Metering	:	Three current transformers with three maximum demand ammeters. 1 x 0-500 Volt voltmeter complete with seven position selector switch and 4 Amp fused protection.

PMA 8.4.4 **Identification**

Labels of black trafalite engraved with white letters shall be fitted to suitable frames. The labels shall be as described below.

Item	Equipment	Title	Letter Size
(i)	Transformer breaker	MAIN CIRCUIT BREAKER	12 mm
(ii)	3 x Ammeters	RØ, WØ, BØ	6 mm
	0 – 500 Voltmeter	VOLTAGE	6 mm
	Selectro switch	VOLTAGE SELECTOR SWITCH	6 m
	3 x 4 Amp fuses	RØ, WØ, BØ	6mm
(iii)	3 x 30 Amp fuses	STREET LIGHT MAINS	12 mm
	kWh meter	ENERGY METER	6 mm
	4 Amp fuse	CONTROL CIRCUIT MAINS	6 mm
	Test switch	STREET LIGHT TEST	6 mm
	20 Amp circuit breaker	STREETLIGHTS 1, 2 AND 3	6 mm
(iv)	Sets of LV reticulation feeder breakers	FEEDER NAME AS PER DRAWINGS	12 mm

PMA 8.4.5 **Spare Fuses**
Two spare fuses of each size and type shall be provided and mounted in the substation.

PMA 8.4.6 **Earthing**

A continuous copper bar measuring 25 x 6 mm shall be fitted to run from the HV compartment through the transformer section to LV compartment.

PMA 8.4.7 **Substation ancillaries**

The following ancillaries shall be provided and installed.

(i) Danger signs type WS7 to SABS 1186 manufactured from sheet aluminium of 150 x 150 mm size. Mounting shall be in clearly visible positions on the front and back of the transformer.

(ii) All control handles and operating cranks shall be mounted in a safe firm position in the respective compartments.

(iii) A plastic envelope with single line diagrams and operating instructions shall be provided in each compartment in a safe position.

(iv) Substation name shall be fitted in a prominent position with letter size not less than 30 mm.

PMA 8.4.8 **Locks**

All doors shall be fitted with approved locks.

Locks shall be of the 40 mm Viro-type with hardened brass hasps and rust resistant mechanisms. The locks shall be keyed to a reserved number to be provided by the owners.

PMA 8.5 INSTALLATION

PMA 8.5.1 General

Substations shall be erected generally in the positions indicated on the drawings. The exact positioning shall be determined on site by the Engineer or his representative after consideration of other services.

PMA 8.5.2 Mounting

A reinforced concrete plinth shall be cast in such a manner that a 75 mm skirt is obtained with respect to the substation base. The plinth shall protrude 150 mm above ground level and shall be to a depth of at least 300 mm below ground level. Suitable access for HV and LV cables shall be provided for vertical rising services.

The concrete shall be of a 1:3:5 mix and the plinth shall be neatly finished.

Six substation mounting bolts shall be cast into the concrete with solder to a depth of 75 mm.

PMA 8.5.3 Connections

HV cables shall be rising through the plinth opening from below into the HV compartment where they shall be made off onto the end boxes.

LV cables shall similarly rise from below and shall be mounted in cable glands. Lugs shall be used for connection to equipment.

PMA 8.5.4 Earthing

The main trench earth shall consist of three 20 m lengths of 70 mm² bare stranded copper conductors installed radially with a separation of 120°. Lugs shall be seated onto the earth conductors and connected to the substation earth bar using brass bolts and nuts.

A 70 mm² bare stranded copper conductor shall be installed at a depth of 450 mm in a ring 1 m from the substation to serve as a potential earth. Termination of the two ends on the substation earth bar shall be as for the main earth.

All earth conductors shall rise through the plinth opening as for cables. Internally the HV switchgear, cable boxes, transformer tank, transformer neutral, LV framework, HV and LV enclosures shall be separately connected to the earth bar using 70 mm ² bare stranded copper conductors with sweated lugs and brass bolts and nuts.

PMA 8.6 TESTS

The following tests shall be performed and witnessed by the Engineer or his representative before the substation is energised and commissioned.

(i) Checking of primary and secondary circuits against wiring diagrams.

(ii) Megger testing of primary and secondary wiring including for protection and metering equipment.

A copy of the manufacturer’s factory test certificate shall be submitted.

SECTION 9 : SCADA SYSTEMS

PMA 9.1 SCOPE

This section covers the supply, delivery to site, installation, testing, commissioning and guarantee for twelve (12) months of a SCADA (supervisory control and data acquisition) system for the monitoring and control of plant parameters and equipment.

This specification covers both radio- and land line telemetry systems. The specific type of system or combination shall be specified in the project specification.

NOTE: The system shall be a purpose designed commercial system for industrial application and not be an adapted or custom-built system. It shall be of reputable manufacture and freely available in all major centres in the RSA.

PMA 9.2 SYSTEM CONFIGURATION

The system shall be of modular construction consisting of:

a) Central station for processing incoming data and outgoing control signals by means of the necessary processing and communication equipment, personal computer, SCADA software and printer;

b) Outstations with processing equipment and input/output (I/O) modules to receive field inputs and control external equipment and the necessary equipment for communication with the central station and other outstations;

c) Power supply to drive the system equipment;

d) Suitable enclosures for housing the equipment;

e) Cabling, earthing and all sundry equipment to complete the installation in fully working order.

PMA 9.3 TELEMETRY

PMA 9.3.1 Central Station

The detail of the central station and computer will be specified in the Scope of Works.

PMA 9.3.2 Outstations

The outstations are scheduled in the Scope of Works.

PMA 9.3.3 I/O Modules

The system shall accommodate both digital- and analogue I/O modules.

a) **Digital**

Inputs shall be suitable for operation with voltage free contacts, protected against accidental voltage input.

Outputs shall be rated for 24 VDC and 200 mA current, suitable protected for the equipment to be driven such as relay coils.

b) **Analogue**

Both inputs and outputs shall be suitable for 0-5 VDC, 0-10 VDC, 0-2- mA and 4-20 mA signals.

Unless specified to the contrary in the Scope of Works, I/O shall always be field connected via a buffer interface.

Buffer interface shall be provided as separate modules. Input buffers can be opto isolated for digital inputs to separate different voltages, or surge arrestor type to protect against over-voltages and lightning both for digital and analogue inputs. Lightning protection shall be by means of surge arrestors rated to 5 kA for 8/20 µs lightning discharge, with additional protection by means of fusing and tranzorbs. Output buffers shall be of the relay type for digital outputs.

The I/O status shall be displayed by means of LED's for digital I/O and on the CPU for analogue I/O.

PMA 9.4 **GENERAL CONSTRUCTION**

Modules shall be mounted on an approved rail for easy detachment. Access to all terminals shall be from the front. All electronic components shall be mounted on and soldered to glass fibre printed circuit boards with a single layer of tracks (maximum) on one or both sides of the board. Circuitry shall be of the low power consumption type for efficient operation from mains or solar power with battery back-up power.

Connection between the communication equipment and CPU shall be by means of robust connectors and wiring harness.

Interconnection between the CPU and I/O modules shall be by means of ribbon cable and quick connect plug in connectors. Field connections to I/O modules shall be by means of plug in screw termination strips, I.e. it shall be possible to remove I/O modules by unplugging without disturbing field connections. Plugs and sockets shall be designed to prevent misalignment when plugging in.

PMA 9.5 **COMMUNICATION**

PMA 9.5.1 **Radio Linked System**

The radio shall be a single frequency simplex VHF/UHF FM system, operating within the relevant commercial frequency bands and approved by Telkom. Dual frequency radios are only to be used in conjunction with repeater stations. Radios shall be fixed with brackets inside the enclosures.

It shall be suitable for speech communication on the same frequency as for data transmission, for purposes of maintenance, without interfering with the telemetry data transmission.

It shall be the responsibility of the Tenderer to establish the required radio power, radio coverage and determining the frequency band. Should a physical radio coverage survey be required the Tenderer shall qualify his tender accordingly and state the financial implications to carry out such a survey.

The contractor shall be responsible to apply for the radio licence on behalf of the Employer. The frequency to be applied for shall be determined in conjunction with the Employer.

PMA 9.5.2 **Antenna**

The antenna shall be suitably selected for the project, matching the system operating parameters and site conditions.

The antenna mast shall be manufactured from 50 mm ø (min) tubular 3 mm (min) thick hot-dip galvanised steel tubing. It may be wall mounted where there is an existing building. The mast shall be secured to the wall by means of a heavy-duty galvanised steel bracket providing off-set as required by the roof overhang. All mounting brackets fixing bolts, anchor bolts etc, shall be stainless steel or hot-dip galvanised.

Masts for outstations shall be self-supporting. Up to 9 m high masts shall be of the flagpole type, and be able to withstand wind loads up to 140 km/h. Masts in an excess of 9 m shall be of the lattice type.

The co-ax antenna cable shall be as follows: VHF : RG 213AV
UHF : 13 mm foam Heliax low loss

All cables are to be provided for in the tender.

PMA 9.5.3 **Earthing**

Earthing shall be provided by means of a 35 mm² bare copper earth conductor taken from the junction between the antenna and mast to a 1,2 m earth rod as close as possible to the mast. A separate 10 mm² bare copper earth conductor shall be installed with the co-ax antenna cable to the equipment enclosure. From the equipment enclosure earth stud a 35 mm² bare copper earth conductor shall be installed to the earth rod.

PMA 9.5.4 **Land Line Linked System**

The communication cabling network shall be provided in accordance with the field bus requirements and suitably protected.

Unprotected cabling used indoors shall be installed in galvanised steel conduit, PVC trunking or cable rack depending on the amount of cabling and the environment.

Unprotected cable for external use mounted on buildings shall be installed in galvanised steel conduit. Cable for installation directly in ground shall be wire armoured, with PVC or similar hard wearing protective outer sheath.

PMA 9.6 **DATA TRANSMISSION**

a) **Format**

Data shall be transmitted in digital format according to recognised international standards. Coded words shall be compiled to allow comprehensive error detection techniques to ensure maximum data integrity.

b) **Communication bus (land line systems)**

The communication system shall be a high performance open architecture network designed for industrial application on internationally recognised and accepted standards. It shall have a high noise immunity.

The system shall support equipment from other Vendors, supporting the specific communication bus systems. Full particulars on the communication bus system, applicable standards and equipment Vendors supporting the system, shall be provided with the tender.

c) **Message acknowledgement (radio based systems)**

A switch selectable facility shall be available for the transmitted messages to be acknowledged by the receiving station. If the message has not been acknowledged after a preset time, the message shall be re-transmitted. The procedure shall be repeated for a fixed number of attempts.

d) **Multiple transmission (radio based systems)**

Provision shall be made on the CPU for single or multiple transmission command by means of switch selection.

e) **Addressing**

Each station shall have an address, preferably to be manually set numerically on the module to allow easy field maintenance replacement and set up of modules. No specialised equipment other than that forming permanent part of the installation, shall be required to set up addresses.

f) **Operational modes**

The system shall be able to operate on change of state of any of the inputs, as well as on a time basis where transmission of data is at regular time intervals, the interval to be user selectable.

It shall be possible to interrogate a station from any other station with the station activities displayed on the CPU unit.

PMA 9.7 **POWER SUPPLY**

The telemetry system shall be operable from the following power sources, the specific one or combination to be specified in the Scope of Works.

a) **Mains supply**

An industrial type power supply operating off 230 V 50 Hz AC shall be provided to the system requirements. The power supply shall be capable to provide at least 50% more than the peak demand of the system.

b) **Mains with battery back up**

A sealed maintenance free battery shall be provided to supply the total static load for the system to be fully operational for twelve (12) hours. The charger shall recharge the battery within ten (10) hours whilst deliver total static load and shall have an automatic boost facility. Once on trickle charge, the output shall automatically adjusted not to overcharge the battery.

c) **Solar panel with battery**

A solar panel with voltage regulator shall be used to charge the batteries.

The batteries shall be rated to provide fully operational back-up for four (4) days.

The regulator shall be specifically designed for telemetry use and solar power. It shall have a over-voltage cut out it the battery voltage exceeds a preset limit, as well as a under-voltage cut out if the battery voltage falls below a set limit. The load shall reinstate automatically once the battery voltage is normal again.

PMA 9.8 **PERIPHERAL EQUIPMENT**

It shall be possible to interface the telemetry equipment to peripheral equipment, such as a printer or PC, by means of adding a standard RS232 interface module.

PMA 9.9 **ENCLOSURE**

Indoor enclosures shall be manufactured from 1,6 mm mild steel with epoxy powder coat finish and wall mounted. Protection degree shall be IP44. It shall be fitted with a hinged door, with quarter turn coin slot screws of square key type locks.

A termination strip for incoming and outgoing cables shall be provided at the bottom of the cabinet for all outgoing and incoming wiring. No wiring shall be directly connected to processing or I/O equipment.

Outdoor enclosures shall be of similar construction, but manufactured to protection degree IP55. The enclosure shall be hot-dip galvanised after manufacture, or manufacture from 3CR12. It may be pole or plinth mounted, with an additional glass fibre or sheet steel outer enclosure, for protection against direct sunlight to prevent heat build-up. It shall provide sufficient ventilation for the inner enclosure. Doors shall be padlockable, the padlock type and number shall be obtained from the Employer.

PMA 9.10 **SCADA**

PMA 9.10.1 **Software**

The software shall be a commercial package operating in a Windows environment as specified in the Scope of Works. It shall provide for:

a) The graphic representation of plant and process, displaying the parameters to be monitored.

b) Control of equipment.

c) Processing and display of data in dynamic graph format as well as arching for trend display over a period of time.

PMA 9.10.2 **Monitoring of Parameters**

The parameters to be monitored are specified in the Scope of Works.

These parameters shall be graphically displayed in terms of schematic layouts of the overall plant/process and individual equipment, with display of the status and/or analogue values of the parameters monitored.

The detail schematic layouts for the graphic displays shall be determined in conjunction with the Engineer.

a) **Motor status**

In the case of motors, the graphic display of status for specific conditions shall be represented in different colours in the following format:

STATUS	DEFINITION	GRAPHIC DISPLAY
OFF	Motor circuit breaker or MANUAL/OFF/AUTO selector switch in OFF (not in AUTO or MANUAL) position. Refer Note 1, 2	Motor symbol WHITE and text OFF
ON (Available)	Motor circuit breaker ON and MANUAL/OFF/AUTO selector switch in either MANUAL or AUTO position. Refer Note 1, 2	Motor symbol YELLOW with text ON
MANUAL	MANUAL/OFF/AUTO selector switch in MANUAL position. Refer Note 2	Text under motor symbol MANUAL
AUTO	MANUAL/OFF/AUTO selector switch in AUTO position. Refer Note 2	Text under motor symbol AUTO
RUN	Motor running Refer Note 3	Motor symbol colour GREEN
TRIP	Any motor protection device in tripped condition Refer Note 4	Motor symbol colour RED

Note 1: Interposing relay wired to control voltage via an auxiliary switch on the motor circuit breaker. NO contact of interposing relay (de-energised state) wired to telemetry terminals.

Note to pick-up point shale be before any motor protection contacts such as overload, etc.

In the case of existing (older) switchboards, it may not be possible to fit auxiliary contacts to existing switchgear. In such cases it will be acceptable to wire the above-mentioned relay to the motor circuit breaker load side (same phase as control voltage), via a suitable HRC fuse.

Note 2: Interposing relay wired to control voltage via NC contact on MOA selector switch each for MANUAL and AUTO position. NO contact on each interposing relay (de-energised state) wired to telemetry terminals.

Note 3: This contact shall relate directly to the running condition, e.g. an auxiliary contact on the final starting device (and not in accordance with a start signal)

Note 4: NO contact of interposing relay (de-energised state) wired to telemetry terminals. All motor protection devices shall energise this relay (common).

Refer also to PMA 9.10.3.3 on switchboard interfacing.

b) **Alarms**

With any one graphic layout on display, an alarm condition at any other station shall bring up a visible alarm on the current display, as well as an audible alarm with alarm accept facility. In addition to the hardwired alarms from equipment monitored, software generated alarms shall be provided for instances where a start signal is given but a motor does not stop. This alarm shall be functional in AUTO mode only.

An onscreen reset push button shall be provided.

Alarm conditions which are not provided with a hard-wired latched facility in the switchboard, shall be provided with a software latch and on-screen retest push button.

PMA 9.10.3 **Control**

PMA 9.10.3.1 **Automatic**

Automatic control of equipment shall be provided as specified in the Scope of Works.

PMA 9.10.3.2 **Remote Manual Control**

It shall be possible to manually stop and start equipment, accept and cancel/reset alarms remotely at the central station via the PC keyboard. The specific remote control required, if any, will be specified in the Scope of Works.

Individual on-screen buttons shall be provided for the following functions:

a) Remote control select ON/OFF

b) Motor start

c) Motor stop

d) Alarm cancel

e) Alarm reset (specific alarm as per project specification)

This function shall operate (via the keyboard) as follows:

- Remote control shall be selected by means of two on-screen push-buttons marked “REMOTE CONTROL ON/OFF”. Selecting “ON” shall cause a NO contact at the outstation to close; selecting “OFF” shall cause that contact to open. The contact shall switch on a blue indication light on the equipment to be controlled, labelled “REMOTE CONTROL ON”.
- Selecting REMOTE CONTROL shall not cause change of status of any equipment, until a further command is given. I.e. running motors shall keep on running, until stopped by a second action.
- REMOTE CONTROL shall be operative only if the controlled equipment is in auto mode (selected on equipment control panel). However, switching the MANUAL/OFF/AUTO selector switch to OFF, shall stop the pumps.
- All protection devices usually operational in manual mode (selected on equipment control panel) shall be functional in REMOTE CONTROL.
- Remote starting of a pump shall pulse a NO contact in the outstation panel close, as a control signal to the MCC. (Refer Note).
- Remote stopping of a pump shall pulse a NC contact in the outstation panel open, as a control signal to the MCC. (Refer Note).
- Remote acceptance of a general alarm shall pulse a NC contact in the outstation panel open.
- Remote alarm reset shall pulse a NC contact in the outstation panel open.

NOTE (1):

If the normal auto START/STOP signal is a single change-over contact, the remote START/STOP can also be a single contact.

NOTE (2):

If this auto START/STOP contact is transmitted via the telemetric system, the manual START/STOP control can utilise the same contact.

PMA 9.10.3.3 **Switchboard Interfacing**

All digital parameters (signals) to be monitored from switchboards and controlled from the telemetry panel shall be via voltage free contacts from interposing relays. Voltage sensing shall be from the same phase as the control circuit phase and applied to the

coil of the interposing relay, switching the voltage free status indication contacts. I.e. no direct voltage transfer may be done between the motor control circuitry (wiring) and the telemetry I/O.

Any voltage status not taken from the motor control voltage shall be protected by an HRC fuse as close as possible to the pick up point, but shall be taken from the same phase as the control voltage.

- Switching from REMOTE CONTROL ON to REMOTE CONTROL OFF, the pump control shall revert back to the status for AUTO operation at that moment. I.e. if the pump is running under remote control and REMOTE CONTROL is switched OFF, with a start signal present the pump shall continue running or stop if no start signal is present. Note this transition shall smooth without a momentary interruption. If the MOA switch is switched to the MANUAL position when the pump is running under remote control, the pup shall stop.

PMA 9.11 **PARAMETER PROCESSING**

The status of all parameters monitored shall be updated on a regular time basis for updating graphic status displays and logging for further processing and logging.

This updating shall be done on a regular time basis to be determined in accordance with the type of parameter, in conjunction with the Engineer. Any change in status, or change in value of an analogue parameter within set limits (as per project specification) in between normal logging intervals, shall be logged as an event. This event shall be taken up in the archive file for depicting trends.

a) Events shall be logged and printed together. Separate printing of alarm logs only shall be user selectable.

   Event printing shall not be automatic, but on user demand and the period covered as set by the user for a specific enquiry.

b) Data (status and analogue values) for trend display, shall be depicted in graph format on a X-Y axis, and dynamically updated on the trend display. This data shall be archive to be monthly or yearly format, on user demand.

   - It shall be possible to “zoom in” onto any section of a graph and expand the scale.
   - Graphs shall be shown on separate screens or grouped in accordance with user preference, on a common X-Y axis.
   - Graphs depicting on/off status of equipment shall show the actual starting and stopping times from the event log and not only the value at updating (interrogation) intervals.

c) Data (analogue) shall also be available in tabular (numeric) format, for spreadsheet manipulation.

d) Software shall provide for full numerical data manipulation in spreadsheet format.

e) Windows based software shall make provision for other application programmes (such as spreadsheet programmes) to run concurrently with the SCADA software on the same host computer, allowing direct data transfer from the archive files to the application program files.

PMA 9.12 **TESTING AND COMMISSIONING**

The system shall be fully factory tested in the presence of the Employer.

After installation, commissioning and testing, a hand-over date shall be arranged with the Engineer. At this hand-over, the system shall be demonstrated to the Engineer to work satisfactory.

At hand-over, the Contractor shall provide three copies of a operating and maintenance manual for the installation.

It shall provide sufficient information on the hardware for routine type maintenance, as well as full descriptions of start-up and set up procedure and operation.

After hand-over, the Contractor shall be responsible to give full training on site in operation and maintenance of the system to designated personnel of the Employer until they are fully conversant with the installation.

SECTION 10 : AFTER SALES SERVICE

Should the employer wish to enter into an agreement with the successful tenderer for servicing the plant so as to ensure its future performance, the tenderer must be prepared to do so and state in a covering letter the following:

(1) The cost of one annual visit to check the plant and check on its efficiency.

(2) Whether spares for all parts of the plant are available ex stock.

(3) Whether the cost of replacement of parts will be included in the cost of the visit, but it is understood that the cost of the spares will be an extra.

This agreement will commence after the one year guarantee period of the plant has transpired.

SECTION 5: BOREHOLES

DRILLING OF BOREHOLES (PART 1)

PA 1 SPECIFICATIONS

PA 1.1 SCOPE

The specifications are for the drilling of boreholes, installation of casings and for the development and capping of boreholes for rural water supply.

The Contractor shall provide all labour, transport, plant, tools, materials, and appurtenances, and shall perform all work necessary to satisfactorily construct and complete the boreholes in accordance with this Specification and to any further details as may be ordered by the Engineer. The borehole depths will be dependent on drilling results and the strata intersected.

PA 1.2 EQUIPMENT

The equipment to be used must be of such standard that the requirements as set out in the Project Specifications can be accomplished without any disruption of the works.

- The Contractor shall specify in the List of Available Plant and Equipment the type of plant he intends to use as well as the method of operation. Its capacity shall be sufficient to cope with the work as specified for each particular work order. It shall be kept at all times in full working order and in good repair. The Engineer will reserve the right to inspect the equipment to be used for the completion of the Works prior to the commencement of the Works.

- If the Engineer considers that the plant in use on the site of the Works is in any way inefficient or inadequate in capacity, he shall have the right to call upon the Contractor to remove such plant and replace it with additional plant or equipment which he considers necessary to meet the requirements of the Contract. In the event that his requirement is not satisfied, the Engineer reserves the right to advise the Employer to terminate the Contract immediately.

- It is a requirement that:-

  Compressors shall have a minimum capacity of
  21 Bar pressure at a flow rate of 22 m^3/min;
  Drill rigs used shall be mounted on a 6X4, 4X4 or 6X6 truck.

- It will be the responsibility of the Contractor to arrive on site with all equipment required to complete the work without interruption.

PA 1.3 MATERIALS

All materials to be used shall be new and undamaged and shall be supplied and delivered as such on site.

All materials required in the drilling and construction of the boreholes shall be assembled in an approved manner and in accordance with normal groundwater engineering practice.

PA 1.4 DRILLING

i) Drilling Techniques

a) Rotary Percussion Air Flush Drilling

Where the geological formation comprises consolidated rock with limited overburden the standard drilling technique shall be rotary percussion air flush drilling unless otherwise ordered by the Engineer. Under this technique provision must be made for drilling through boulders (Alluvial deposits) and the provision of Odex Air Percussion drilling for advancement through collapsible layers.

b) Rotary Mud Drilling

Where the geological formation comprises predominantly unconsolidated soils and subordinate partially to well cemented sediments, the standard drilling technique shall be rotary mud drilling unless otherwise ordered by the Engineer. Under this technique provision must be made for drilling through boulders.

Both drilling techniques shall further include the necessary facilities with adequate capacity to consistently introduce lubrication water and/or foam as required.

ii) Design and Depth

Various borehole design options will be employed. Typical Borehole Design Options include:

Typical Construction Detail

a) Boreholes in Consolidated Rock Formations

Hand pump type borehole (with outer casing only)

Production type borehole (lined with inner casings, perforated casing and/or screens)

b) Boreholes in Unconsolidated Soil Formations
Hand pump & production type borehole

The decision as to which design to use will be made by the Engineer. The Engineer will base his decision(s) on geological conditions encountered as well as the final diameter to which the borehole must be completed.

It is anticipated that borehole depths will vary typically between 60 m and 120 m. The Engineer will determine the final borehole depth and boreholes shallower than requested will not be acceptable and will not be paid for, unless it can be satisfactorily proved that the borehole cannot be drilled to the required depth.

A minimum 10 m sump will be drilled below the level at which the major water strike is intersected or to a level as specified by the Engineer.

iii) Drilling Diameter

Drilling diameters will be 165 mm, 204 mm, 254 mm. The Engineer will specify the diameter/s for each borehole to be drilled.

iv) Drilling Media

The Contractor may not use drilling media which may cause borehole erosion or involve the use of native clay, oil, salt or any lost circulation agent, sawdust, cement, or any form of plugging that could affect the production capacity of the water bearing strata intersected.

In the event of circulation losses, commercially available foam can be introduced during drilling operations.

v) Drilling Foam

The Contractor at his own discretion and cost may use drilling foam.

vi) Straightness and Verticality

a) Straightness

Boreholes shall be sufficiently straight to permit a steel tube 6 m in length and with outer diameter no more than 15 mm smaller than the inner diameter of the cased borehole, to be lowered without hindrance to the full depth of the particular borehole. Any deviation, which prevents the lowering of such plumb to the bottom of the borehole, will not be accepted, and the hole declared a lost borehole. The Contractor shall, in such case, re-drill the hole at his own cost to specification. The Contractor shall ensure that the above piping, complete with the necessary attachments and equipment required for testing straightness, is available at the drilling machine and such piping shall form part of his standard equipment.

b) Verticality

The centre of the borehole at any depth shall not deviate from the vertical through the centre of the borehole at the top by more than one-third (1/3) of the borehole diameter per 20 m of depth.

The diameter of the deviation of a borehole from the vertical shall be carried out in accordance with the latest issue of SABS 045. The apparatus referred to in SABS 045 shall be supplied by the Contractor and shall form part of his standard equipment under this Contract.

In the event that these requirements for verticality are not met, the borehole will be declared a lost borehole. The Contractor shall thereupon re-drill the hole at his own cost, to specification.

vii) Sampling

Representative drilled cutting samples of the materials intersected shall be collected every metre and stacked in a representative fashion per rod length completed on a cleared patch near the drilling site. The samples shall be clearly marked and fenced off to prevent tampering and the borehole information recorded on the Borehole Drilling Report as supplied to the Contractor and as outlined in Clause 1.11.

viii) Blow Yield Measurement

Blow yield measurement shall be undertaken and recorded during drilling operations in order to establish the blow yields for different water strikes occurring in each borehole.

ix) Cleaning of Borehole

On completion of drilling a borehole the borehole shall be cleaned out, developing the borehole for a minimum duration as stated below, or as otherwise specified by the Engineer under Clause 1.6 (i).

a) unconsolidated material - 6 hours.
b) consolidated material - 2 hours.

x) Water Quality Testing

'ph' and electrical conductivity (EC) readings are to be recorded on a fresh sample of groundwater taken on final completion of drilling operations and cleaning of borehole as given in Clause 1.4 (ix).

xi) Water Level Monitoring

Water level measurement is to be recorded prior to the capping of the borehole.

xii) Disinfection

On completion of cleaning of borehole and water quality testing the borehole shall be disinfected with a solution of 0,5 kg of HTH mixed in 250 litres of water.

xiii) Reaming

Where a borehole has previously been drilled to a smaller diameter than that required, the original borehole should be reamed to the required diameter as specified by the Engineer. Reaming shall comprise the widening of the existing borehole using rotary percussion air flush methods for varying borehole diameters advanced through all types of consolidated rock formations encountered. Reaming shall be to one of the following diameters: 204 mm, 219 mm or 254 mm.

PA 1.5 CASING, PERFORATED CASING AND SCREENS

i) General

The Contractor shall supply casings, perforated casings and screens as specified in the Schedule of Rates or as specified otherwise by the Engineer. Mild steel casing will be used predominantly.

All materials to be used shall be new and undamaged and shall be supplied and delivered as such on site.

ii) Plain Casing

Plain casing shall be used as an outer and/or inner lining to a borehole and shall be made of either mild or steel or PVC depending on the nature of the formation and as determined by the Engineer.

The outer casing shall be inserted through the overburden and any zones of non-potable/undesirable seepage water and driven into the consolidated rock formation below. The inner casing shall be installed in conjunction with perforated casing and/or screens.

All steel casing shall have a minimum wall thickness (as specified) and shall be level edged. All PVC casing shall be a minimum CLASS (as specified) and shall be threaded both ends. All steel casing shall be weld jointed and all PVC casing joined with threaded sockets unless otherwise specified by the Engineer.

Casing shall be installed to depths as specified by the Engineer. After completion of the work, the casing shall protrude a minimum of 500 mm above natural ground level.

The casing shall be of the diameter specified, self-aligning and from approved suppliers. It must be possible to uplift, disconnect and re-use the casing.

iii) Perforated Casing

Perforated casing shall be used as an inner lining to a borehole where collapsing conditions occur at water bearing horizons and for production boreholes. The perforated casing shall be made of either mild or stainless steel or PVC as determined by the Engineer and shall comply with the requirements of Clause 2.5 (ii) for Plain Casings. The perforated casing shall be installed under supervision to levels as given by the Engineer. The casing may be perforated on-site or factory perforated as specified by the Engineer.

a) Perforation on-site

The manner in which the perforations are to be cut is shown in Figure 1. The width of the perforations shall be as specified by the Engineer within the range of 1 mm minimum and 4 mm maximum. The perforations shall be of uniform width with no resultant protrusions and shall be clear of debris.

b) Factory Perforated Casing

The manner in which the perforations are to be cut will be shown by the Engineer. The perforated casing shall comprise 300 mm long slots at 150 mm intervals with an effective open area of a minimum 2% or as otherwise specified by the Engineer. The perforations shall be cut clean and square and shall be flush with the casing wall. The casing shall be guided and supported by casing centralisers if requested by the Engineer.

iv) Screens

Where production boreholes are constructed the Engineer may request that stainless steel, wedge wire Johnson screens (or equivalent) be installed at the water bearing horizons. The diameter, slot size and % open area of the screens shall be determined by the Engineer. A minimum 0,25 mm slot size and minimum 20% open area is allowed for in this contract.

The screens shall be installed under supervision to levels as given by the Engineer.

v) Temporary Casing

Where difficult drilling conditions occur, the insertion of temporary casing during drilling and borehole construction will be necessary. This casing must also comply with the requirement of Clause 1.5 (ii).

PA 1.6 BOREHOLE CONSTRUCTION

i) Development of Borehole

On completion of construction the borehole shall be developed to attain the maximum possible yield of groundwater, free of suspended materials. Where the required development time exceeds the stipulated duration as specified in Paragraph 2.4 (ix), approval from the Engineer must be obtained. Development by means of flushing and blowing large volumes of water shall be carried out using either air surging, air jetting, or such other standard techniques as may be directed by the Engineer.

Where there is insufficient natural water in the borehole then sanitised water shall be imported to site by the Contractor to augment the low yielding borehole.

ii) Jetting of Borehole

High pressure water jetting to effectively develop a sand filter shall be carried out on a screened borehole at the instruction and supervision of the Engineer. The jetting tool to be used shall be approved by the Engineer.

iii) Formation Stabilizer/Gravel pack

Where collapsing conditions are found, formation stabilizer is to be inserted in the annular space of the borehole and perforated casing at depths specified by the Engineer. Formation stabilizer material shall be rounded; uniform and clean gravel with a grain size varying between 6 mm and 14 mm. Sieved and washed river gravel can also be accepted. Samples of formation stabilizer must be submitted to the Engineer for approval before placement.

iv) Filter Pack

A filter pack installed between the annular space of the borehole and the Engineer may specify perforated casing or screens for boreholes where specific geological conditions are encountered. The filter material shall comprise clean, graded sand and/or gravel (as specified) and shall be trimmed to the levels as specified by the Engineer. Sanitised water shall be used for this purpose.

v) Grout Backfill/Bentonite Seal

Where specific levels in a borehole require to be sealed off, the Engineer shall specify a grout backfill or bentonite seal. The grout shall comprise a mixture of bentonite, sand and cement as specified by the Engineer.

vi) Capping of Borehole

On completion of the borehole the Contractor shall cap the borehole by completely welding a 2 mm thick steel cover onto the protruding steel casing or by permanently affixing a PVC cap onto the protruding PVC casing. It is the responsibility of the Contractor to ensure that the capping is not broken off and the borehole not damaged.

A borehole identification number will be inscribed onto the capping as given in Clause 1.7.

vii) Plugging of Unsuccessful Borehole

Where an unsuccessful borehole is drilled or a borehole abandoned or lost the outer casing may not be removed.

A borehole identification number and the word ‘DRY’ will be inscribed onto the capping as given in Clause 1.7.

viii) Blow Yield Testing

The Contractor shall carry out a blow yield test after completion of drilling of the borehole as specified by the Engineer. The blow yield test comprises the constant displacement of groundwater at optimum yield using air flush methods with the yield measured by draw-off pipe and bucket method.

PA 1.7 BOREHOLE NUMBER IDENTIFICATION

Each new borehole drilled shall be allocated a Borehole Number issued to the Contractor by the Engineer. It is the responsibility of the Contractor to clearly inscribe the Borehole Number for each new borehole as follows:

Position	Type	Method of Inscription	Details Inscribed
Borehole Capping (for capped successful and unsuccessful Boreholes)	**Steel cover**	**Welding**	**Borehole No. Wet or Dry**
	PVC cap	**Indelible Marker Pen**	

PA 1.8 CESSATION OF DRILLING ACTIVITIES

The termination, at any stage, of drilling operations on a particular borehole shall rest with the Engineer.

PA 1.9 ABANDONMENT

The Engineer shall have the right at any time during the progress of the work to order the abandonment of the borehole. No casing shall be removed, and the Contractor shall leave the borehole to the satisfaction of the Engineer. Payment will be approved for any casing left in the borehole that has been abandoned.

Should the abandoned borehole be considered a potential pollution point source, the Engineer may issue further instructions to effectively seal the borehole.

PA 1.10 LOST BOREHOLE

Should accident to the plant, behaviour of the ground, jamming of the tools or casing, non-compliance of the straightness or verticality test (as specified in Clauses 1.4 (vi)) or any other cause, prevent the satisfactory completion of the works, the borehole shall be deemed to be lost and no payment shall be made for the drilling or borehole construction costs nor for any materials, nor for any time. The cost of materials, which have been recovered, be in good order, then the Contractor shall have no claim for such materials and will have the option to re-use such materials within the scope of the project.

Should the lost borehole be considered a potential pollution point source, the Engineer may issue further instructions to effectively seal the borehole.

In the event of a lost borehole, the Contractor shall construct a new borehole adjacent to the lost borehole, on a site indicated by the Engineer. The option of declaring any borehole lost shall rest with the Contractor, subject to directions from the Engineer.

No payment whatsoever will be made for the lost borehole. Measurement and payment for the construction of a borehole adjacent to the lost boreholes shall be in accordance with the specifications of any other borehole included in this document, provided that the specifications therefore are met.

PA 1.11 REPORTS

The Contractor shall accurately record the following reports:

Name	Description	Supplied
Borehole Drilling Report	An accurate record for each borehole of borehole No., locality, drilling techniques used and stratographic data including depths, strata type, water strike levels, blow yields, casing diameter, lengths, etc.	On completion of each borehole drilled

The Contractor shall not be paid for any work invoiced unless the abovementioned reports pertaining to the work invoiced has been satisfactorily submitted.

The Contractor shall submit each report to the Engineer within 2 days of completion of the work as detailed in the Report. Failure to do so shall be regarded as non-performance in terms of the contract and will be subject to the conditions of contract.

PA 1.12 TESTING PROCEDURES

i) The boreholes allocated to the Contractor shall be tested by means of-

   a) Sequential step-draw-down tests. Four (4) steps of 60 minutes duration each shall be executed.

   b) Recovery measurements shall be in the same fashion as above, but not necessarily have to coincide with the discharges volumes as measured with the step-draw-test.

   c) Constant discharge test with a minimum duration of 4 hours up to a maximum of 48 hours**.**

ii) Water level measurements shall be taken in the pumped hole. Accuracy of less than 10 mm is required. Time intervals for pumping and recovery tests are detailed on the forms supplied with this tender.

iii) Water samples shall be taken during the test period. The Engineer will supply sampling bottles.

iv) Discharge shall be measured twofold either:

   a) by using stopwatch and cubic tank or drum not smaller than 220 litres.

   b) by means of a calibrated measuring device of approved design with a range of 0,2 – 20 l/s.

v) The discharge pipeline should be of sufficient diameter to cope with flows of 20 l/s and should have a length of 100 m or more above ground with facilities for extension of up to 400 m.

vi) The pump(s) should be capable of a variable discharge between 1,500 litres per hour and 108,000 litres per hour. The pump(s) shall be inserted to a depth varying as determined by the Engineer.

vii) Prescribed data sheets should be signed and submitted to the Engineer on completion of tests on each borehole.

viii) The site and borehole collars and caps, if disturbed, shall be restored to original state unless instructed to the contrary. Caps to be welded flush to the casing.

ix) The Contractor should state whether he has, or will have, equipment with a discharge capacity of up to 150 00 litres per hour.

x) The Contractor will be responsible for water level measurements in observation boreholes within 100 meters of the pumped borehole, if available. The timing of these water level measurements are to be the same as those for the constant yield, but will be determined by the Engineer.

xi) The Contractor should ascertain before every test with a dummy run that the erection and lowering of this equipment would cause no damage to either the borehole or his own equipment. Any such damage or loss of equipment is the Contractor's liability.

xii) If, for some reason the Contractor discovers the borehole to be blocked during the dummy run his equipment is to be removed, the borehole capped and the Engineer informed.

xiii) Once the pump test that comprises 4 step tests, which extends to a water level recovery measurement followed by a constant discharge test has commenced, followed by recovery measurement, the Contractor shall not interrupt or terminate the testing procedure until completion thereof.

PA 1.13 INSTALLATION OF HAND/ELECTRICAL PUMP

Hand/electrical pumps must be installed complete as per supplier's guidelines.

A 25 MPa concrete block 'footing' of 1000 mm x 1000 mm x 600 mm with Ref 311 reinforcing mesh with a 40 mm cover on top and sides and Class F1 and U2 finishing with 25 mm chamfers at all corners, must be constructed for hand pumps.

A Certificate of Compliance (COC) must be issued with each electrical pump installed and commissioned.

PA 1.14 SUPERVISION

The Engineer will nominate a suitably experienced drilling supervisor to the Contractor who will be required to supervise and direct the work at all times if applicable.

a) confirmation of borehole positions (with allocated Borehole Numbers) as set out by the Engineer;

b) supervision of drilling operations;

c) reporting of water strike levels and recording blow yield measurement and borehole construction.

DRILLING OF BOREHOLES (PART 2)

PA 2 MEASUREMENT & PAYMENT

The Contractor under this Contract is considered to be an expert groundwater borehole driller and is expected to organise and carry out the work specified hereunder in a competent manner. Drilling problems encountered will be overcome entirely within the framework of this Specification and Schedule of Rates, and no claims for extra payments will be entertained for problems foreshadowed in the Specification or due to limitation placed by this Specification.

PA 2.1 DRILLING SUPERVISION

a) Supervision by geohydrologist ……..…..... Unit: No

Supervision shall be done on a permanent basis by a **qualified geohydrologist** who will oversee the drilling and log samples for all holes drilled. A Report shall be submitted after the project containing the reasons for having drilled to the specific depths, dry boreholes, the installation of type and length of casings as well as the type of drilling utilised.

The rate shall be all inclusive of costs such as but not limited to time, disbursements, subsistence, travelling, etc.

PA 2.2 ESTABLISHMENT PER PROJECT .....……..... Unit: Sum

The rate is inclusive of provision of all equipment, plant, personnel and facilities that are necessary to perform the work as required with establishment thereof for the project including de-establishment on completion of the work order.

PA 2.3 INTER-BOREHOLE MOVE

a) Set-up ….....……..... Unit: No

The rate is inclusive of all transport and personnel required for relocation of the rig and all plant and equipment from one borehole site to another site and the set-up thereof. The provision of sumps is included in the Rotary Mud set-up.

b) Travel …….…….... Unit: km

Moves involving travel over and above the first 10 km travel in Payment 2.3 (a)

c) Access Provision ……..……..……..... Unit: km

The rate is inclusive of all costs required to provide access for the contractor, personnel, plant, tools and equipment to execute the work according to specification where terrain is inaccessible for 4x4 vehicles and 6x6 trucks.

PA 2.4 WATER HAULAGE ……..……..... Unit: m^3

Where additional water is required to be hauled to site in order to satisfactorily carry out Rotary Mud Drilling (Payment Items 2.11), Development of Borehole (Payment 2.12) and Jetting of Borehole (Payment 2.12). The rate is inclusive of all water supply equipment and personnel required to draw and contain water and the haulage thereof from water source to site. Payment shall be made as follows: Unit rate per cubic metre (m^3) of water hauled.

PA 2.5 TRANSPORT OF SPECIAL ITEMS …..... Unit: km

The rates are to include for the provision of suitable vehicular transport and personnel for additional transport of Odex Casing Shoes, Special Casings and/or Screens or Additional Items as directed by the Engineer.

PA 2.6 AIR PERCUSSION DRILLING (abrasive rock) …..... Unit: m

The rates for Air Percussion Drilling are based on diameter and cover all costs for labour, plant, materials, and fuel required for advancement of borehole to specified depths, and which are not covered under other payment items. The Contractor shall be paid a rate per borehole diameter per linear metre advanced for depth ranges up to 200 m under Payment Item 2.6.

PA 2.7 AIR PERCUSSION DRILLING (boulders & alluvium) …….. Unit: m

The rate provides for all additional labour, plant, materials, and fuel required for the successful advancement of the borehole through alluvial boulder layers of any thickness overlying the consolidated rock formation where standard air percussion drilling methods are ineffective. The rates are determined as a drilling rate per borehole diameter for the drilling depth range 0 – 50 m as provided in Payment Item 2.7

PA 2.8 ODEX AIR PERCUSSION DRILLING ……..... Unit: m

The rates for Odex Air Percussion Drilling are based on diameter and cover all costs for labour, plant, material and fuel required for the successful advancement of the borehole through collapsible layers of any thickness overlying the consolidated rock formation where standard air percussion drilling methods are proved to be ineffective, and which are not covered under other payment items. The Contractor shall be paid a rate per linear metre advanced as per borehole diameter of 165 mm only for the depth range of 0 – 100 m under Payment Item 2.8.

PA 2.9 ODEX AIR PERCUSSION CASING SHOE …….. Unit: No

Where Odex Air Percussion drilling is required a casing, shoe shall be used.

Where the requirement for Odex drilling has not been specified in the work order and if special transport of the casing shoe is required the transport cost thereof shall be covered under Payment Item 2.5.

PA 2.10 REAMING ..... Unit: m

The rate provides for all additional labour, plant, material and fuel required for reaming a smaller diameter borehole to a larger diameter as specified by the Engineer. The Contractor shall be paid at a rate per linear metre advanced for the depth range up to 150 m under Payment Item 2.10.

PA 2.11 ROTARY MUD DRILLING ……..... Unit: m

The rates for Rotary Mud Drilling are based on diameter and cover all costs for labour, plant, material and fuel required from advancement of borehole to specified depths and which are not covered under the other payment items. The Contractor shall be paid a rate per linear metre advanced for the depth range up to 150 m under Payment Item 2.11.

PA 2.12 DEVELOPMENT OF BOREHOLE ……. Unit: hr

The borehole development time rate is to cover all the time effectively spent on borehole development as instructed by the Engineer. The Contractor is deemed to have all the necessary equipment on site for development.

On completion of drilling a borehole, a minimum of 2 hours of development is deemed to be the necessary cleaning out of the borehole. The Contractor shall be paid at an hourly rate under Payment Item 2.12.

If additional water is required for development the water haulage cost thereof shall be covered under Payment Item 2.4.

PA 2.13 JETTING OF BOREHOLE ……. Unit: hr

The rate is to cover all the special equipment used and time effectively spent on jetting the borehole a minimum of 6 hours as instructed by the Engineer. The Contractor is deemed to have all the necessary equipment on site for jetting under Payment Item 2.12.

If additional water is required for jetting the water haulage cost thereof shall be covered under Payment Item 2.4.

PA 2.14 INSERTION OF CASING ……. Unit: m

The rate provides for the insertion of permanent casings in boreholes as instructed by the Engineer under Payment Item 2.14.

PA 2.15 REMOVAL OF CASINGS ……. Unit: m

There shall be no payment for removal of casing in boreholes declared lost or in which the casing cannot be set in position due to misalignment or other operational problems. Removal of casing as instructed by the Engineer shall be paid under Payment Item 2.15.

PA 2.16 INSTALLATION OF FACTORY PERFORATED CASING AND/OR SCREENS ……. Unit: m

Where factory perforated casing and/or screens are to be installed in production boreholes in accordance with specific instructions under the supervision of the Engineer a metre rate shall cover all costs for the installation thereof under Payment Item 2.16.

PA 2.17 PERFORATION OF CASING (ON-SITE) ……. Unit: m

The rate provides for the on-site perforation of plain casing as supplied under Payment Item 2.22 and is inclusive of all equipment and labour required for perforation. The Contractor is deemed to have all the necessary equipment on site for perforation. Payment shall be measured at a rate per linear metre of casing perforated under Payment Item 2.17.

PA 2.18 FORMATION STABILIZER/GRAVEL PACK ……. Unit: m^3

Where instructed by the Engineer a formation stabiliser or a gravel pack shall be inserted and will be measured at a rate per cubic metre (m^3) of material supplied and inserted under Payment Item 2.18.

PA 2.19 FILTER PACK ……..…….…….... Unit: m^3

Where instructed by the Engineer a filter pack shall be inserted and will be measured at a rate per cubic metre (m^3) of material supplied and inserted under Payment Item 2.19.

To take into account the higher cost of a special supply of filter material (specified by the Engineer) payment shall be made for the supply and insertion of a minimum 0,5 m^3 of filter pack at a time.

PA 2.20 GROUT BACKFILL/BENTONITE SEAL ……..... Unit: m

Grout backfill/Bentonite Seal shall be paid for at a rate per linear metre inserted under Payment Item 2.20.

PA 2.21 CAPPING OF BOREHOLE ……..……..….... Unit: No

The rate for capping of a borehole of varying diameter includes the provision and affixing of the steel or PVC cover to the steel or PVC casing respectively and the inscription of the borehole number identification thereof under Payment Item 2.21.

PA 2.22 SUPPLY OF MILD STEEL CASING, SPECIAL CASINGS AND SCREENS ..……..…….…… Unit: m or No

Payment under Payment Item 2.22 for the cost of supply, transport, delivery and safekeeping on site of mild steel casing, special casings and screens of varying diameter and wall thickness with fittings as specified by the Engineer shall be on the basis of proven cost with a percentage mark up of 12% on the net price (excluding VAT). Payment shall be made only for materials used and shall be calculated for each completed borehole. No claims for extra payment will be entertained by reason of remoteness. The Contractor shall purchase the specified casings and screens on the basis of competitive quotes as approved by the Engineer.

There shall be no payment for casings and screens declared lost or made unusable due to damage thereof.

Where the requirement for special casings and screens has not been specified in the work order and if special transport as approved by the Engineer is required to deliver these items to site the cost thereof shall be made in accordance with Payment Item 2.5: Transport of Special Items.

PA 2.23 ADDITIONAL ITEMS

Where Additional Items are specified by the Engineer and rates are not included in the Schedule of Rates, the costs thereof shall be recovered on the basis of proven cost with a percentage mark up of 12% on the net price (excluding VAT).

Payment shall be made only for materials used and shall be calculated for each completed borehole. No claims for extra payment will be entertained by reason of remoteness. The Contractor shall purchase specified materials on the basis of competitive quotes as approved by the Engineer.

A provisional sum is provided for these expenses and shall only be paid at the written instruction of the Engineer

The ‘proven cost’ shall then be approved by the Engineer on the following basis:

a) Materials ……..……..……..…… Unit: Prov Sum

Original invoices and receipts provided by the Contractor.

b) Labour ……..……...……..…….. Unit: Prov Sum

A daywork rate with calculations based on the aggregate of the gross remuneration of the workmen and of the foreman for the time they are actually engaged on the work concerned.

PA 2.24 TESTING OF BOREHOLES

(a) Setup, test run, installation, calibration of equipment

(i) For yield up to 10 l/s and 100 m deep ……. Unit: No

(ii) Extra- over (a)(i) per metre deeper than 100 m ……..….. Unit: m

The rate shall cover the cost for set-up, “dummy run”, installation and calibration of equipment for each test, borehole disinfection and protection.

(b) Travelling for inter-borehole move ……..……..…….Unit: km

The rate shall cover all cost incurring for travelling and moving plant between boreholes for testing of boreholes.

(c) Sequential step-draw-down tests of 60 minutes duration ….....…. Unit: hr

The rate will cover the cost for executing all necessary processes for each step separately.

(d) Recovery measurement to 90 % of static water level ..…….…..... Unit: hr

The rate shall cover the cost for all proceedings during the period at an hourly rate.

(e) Constant discharge test

(i) For yield up to 10 l/s ……..…….. Unit: hr

(ii) Recovery measurement to 90% of static water level ……..…… Unit: hr

The rate shall cover the cost to perform the test and will be measured separately for (a) Blow yield and (b) time.

(f) Sampling of water and test for human consumption ……..….. Unit: No

The rate shall cover the cost for taking a water sample per borehole according to the SANS Standards, the correct transporting of the sample to a commercial laboratory and the subsequent chemical and bacteriological tests to determine whether the water is acceptable for long term human consumption together with a Report per borehole sample taken.

C3.5: MANAGEMENT

C3.5.1 MANAGEMENT OF THE WORKS

C3.5.1.1 Applicable SANS and SANS Standards

The SANS 1200 Standardized Specifications listed in C3.4.1.1 are applicable.

C3.5.1.2 Particular/Generic Specifications

Not applicable.

C3.5.1.3 Methods and Procedures

(a) Maintenance of access and streets

Not applicable.

(b) Blasting operation

Not applicable.

(c) Normal working hours

Normal working hours shall be from 07h00 until 17h00 on weekdays from Monday to Friday. It shall be from 07h00 until 13h00 on Saturdays.

Work on other days will only be allowed after written approval has been granted by the Engineer.

(d) Interference with municipal staff and operations

The Contractor shall ensure that none of his staff interfere in any way with any municipal staff member or their functions in any way.

Any person ignoring this shall be removed permanently from site, all at the expense of the Contractor.

(e) Access for other contractors

The Contractor shall provide reasonable access to other Contractors carrying out work on the site from time to time, as and when such access is required. The Contractor is entitled to request reasonable notification of at least 24 hours before access by others is required.

The contractual responsibilities of the Contractor shall remain in full force in spite of the other Contractors having access to the site.

(f) Giving notice of work to be covered up

The Contractor shall give the Engineer at least 48 hours' notice prior to a request for examination of materials or work to be covered up. This request must be made in the request book on site.

Should such a request be made and upon inspection the Engineer found that the works or materials are not yet ready for inspection, the Contractor shall reimburse the Engineer within 30 days of invoice for all expenses incurred as a result.

(g) Sequence of the works

The Contractor shall arrange with the Technical Department of the Municipality and the Engineer the sequence of the works to ensure the surrounding residents are fully informed.

C3.5.1.4 Quality plans and control (Testing)

Refer to Section C3.4.2.5(b).

C3.5.1.5 Environmental Management Plan (EMP)

The contractor shall comply with the following, but not limited to, environmental requirements. These requirements are supplementary to the latest amended OHS Act.

(a) Demarcation of the site

For the purpose of the EMP, the site shall be demarcated into two distinct areas, viz.;

(i) The construction camp comprising all buildings, hostels, offices, lay down yards, vehicle wash areas, fuel and material storage area, batching areas and other infrastructure that is required for the running of the job.

(ii) The working area in which construction activities are permitted to take place. No infrastructure, permanent lay down or storage areas shall be established in this working area unless specified in the project specification or prior approval is obtained from the Engineer.

(b) Construction camp

The Contractor shall provide the Engineer with a plan showing the positions of all buildings, yards, vehicle wash areas, batching areas and other infrastructure for approval by the Engineer at least ten (10) days prior to the commencement date.

(c) Fencing of site

If a temporary fence is required, the Contractor shall erect and maintain such a fence (demarcating the boundary of the working area, construction camp and access roads) to the satisfaction of the Engineer.

This fence shall be erected before the commencement of any other work on site. The fence shall be removed after completion of the project and the site reinstated to its original state.

(d) Workshops

All workshops shall be located inside the demarcated construction camp area as approved by the Engineer prior to establishment. The workshop shall have a smooth impermeable concrete floor sloped to one side where oil is trapped in an oil trap or sump to contain any spillages of substances such as oil.

Waste material shall be disposed of in accordance with the national, regional and local by-laws regulations and by-laws. The waste shall be regularly removed and disposed of at an approved site.

(e) Eating areas

The Contractor’s employees shall eat in a designated eating area indicated on the drawing approved by the Engineer. The Contractor shall provide adequate shade and provide scavenger proof and waterproof refuse bins. Cooking will only take place in this area on well maintained gas cookers with fire extinguishers present. Open fires other than the gas cookers shall not be allowed.

(f) Watchmen

The Contractor shall have a watchman present on site during non-working hours and on holidays to ensure the safety of plant and materials on site.

(g) Ablution facilities

The exact location of toilets shall be approved by the Engineer. The Contractor shall provide the toilets and maintain and service it on a daily basis. The toilets shall be kept clean. Regular inspections shall be conducted by the Engineer. Burial of waste on site is strictly forbidden. Leaking or broken toilets shall be removed and replaced immediately by the Contractor.

(h) Solid waste

"Solid waste" refers to construction debris, chemical waste, tins, cans, paper, wrappers, excess concrete, waste timber, etc.

The Contractor shall establish a waste control and removal system. He shall submit a method statement to the Engineer for approval prior to commencement.

Appropriate solid waste containers shall be provided for the storage of waste. The containers shall be water proof. The waste shall be removed on a regular basis to prevent the accumulation of waste on site and disposed of at an approved waste site.

(i) Wastewater

Water shall be used sparingly on site. Where possible, wastewater shall be recycled. A wastewater management plan shall be submitted to the Engineer for approval 10 days prior to the commencement date.

The management plan shall detail the expected extent of the contamination of each wastewater stream and how the Contractor plans to deal with it.

Wastewater shall be prevented from flowing into the Olifants River.

(j) Fuel storage area

Fuel shall be stored on site in a depot at a location as agreed with the Engineer. The Contractor shall ensure that liquid fuels are stored in tanks with lids. The tanks shall be placed on a sloped smooth concrete surface with an oil trap on the lower end to collect any spillage.

Fuel shall be kept under lock at all times.

(k) Concrete batching area

Cement and concrete is hazardous to the environment due to the high pH of the material and the chemicals it contains.

The Contractor shall furnish to the Engineer for approval a method statement for the mixing of concrete. Concrete shall not be mixed directly on the ground. Care must be taken to ensure that wastewater and contaminated material is collected and disposed of correctly.

(l) Equipment maintenance and storage

All equipment and vehicles shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from site. Where possible, maintenance and service shall take place only in the workshop. Permission must be obtained from the Engineer if the aforementioned cannot be adhered to.

The Contractor shall demarcate an area in which the equipment and vehicles may be stored. The location shall be approved by the Engineer.

(m) Materials handling, use and storage

The Contractor is responsible to ensure that all material suppliers are aware of the EMP's restrictions and conditions. The Contractor shall be held responsible should deliveries not comply with the EMP requirements.

The Contractor shall comply with all relevant national, regional and local legislation with regard to the transport, use and disposal of hazardous material.

The Contractor shall furnish to the Engineer a list of all hazardous materials to be used on site, together with the handling, storage and disposal procedures of the materials. This information shall be available to all personnel on site.

The location of the hazardous material store shall be within the demarcated construction camp area. The location shall be approved by the Engineer.

Where possible, the Contractor shall ensure that the refuelling of vehicles takes place only at the fuel storage area in the construction camp. If this is not possible, the Contractor shall obtain permission from the Engineer to refuel at any other place. Contaminated material and wastewater at the refuelling area shall be contained and disposed of correctly.

(n) Emergency procedures

The Contractor shall ensure that emergency procedures for the following situations are submitted for approval to the Engineer;

Fire – the Contractor shall inform the relevant authority immediately as soon as a fire starts. The Contractor shall ensure that his staff and subcontractors are fully aware of the procedures to be followed in the event of a fire.

Spillages – the Contractor shall ensure that his staff and subcontractors are fully aware of the procedures to be followed in the event of a spillage. The Engineer must be informed immediately about a spill. The Contractor shall ensure that the necessary materials and equipment is on site to deal with spills and leaks. The cleanup of spills and leaks shall be for the account of the Contractor.

(o) Care of surrounding areas

The Contractor shall ensure that no contamination of or damage to the surrounding areas or watercourses shall occur as a result of any of his activities during construction.

C3.5.1.6 Planning and programming

The programme to be furnished by the Contractor to the Engineer for approval shall be in the form of a Gantt chart. The critical path shall be indicated in red.

C3.5.1.7 Other Contractors on site

No other pipe construction contractors will be on site unless approved by the engineer.

C3.5.1.8 Recording of weather

The Contractor shall record the weather conditions on a daily basis in the site diary. Rainfall figures and strong wind which could delay the Works shall be noted and recorded.

C3.5.1.9 Format of communications

All communication regarding the Contract shall be channelled through the Engineer or his representative in writing.

C3.5.1.10 Planning and programming

Management meeting shall be held monthly on site for the duration of the project on dates to be agreed upon.

C3.5.1.11 Daily records

Daily records of plant, personnel, materials, etc., shall be kept daily by the Contractor and noted in the site diary (triplicate format) to be supplied by the Contractor before commencement date of the project.

C3.6: HEALTH AND SAFETY

C3.6.1 HEALTH AND SAFETY REQUIREMENTS AND PROCEDURES

Before starting work on site, the Contractor shall present to the Engineer his Health and Safety Plan for approval. He shall also appoint a health and Safety Officer in writing and give a copy of the letter of appointment to the Engineer.

The Health and Safety Specification is attached as Appendix B and must be referred to when compiling the Health and Safety Plan.

(a) Construction Regulations, 2014

The Contractor shall be required to comply with the Occupational Health and Safety Act, 1993: Construction Regulations, 2014 (the regulations) as promulgated in Government Gazette No 25207 and Regulation Gazette No 37305 of 7 February 2014. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

The proposed type of work, materials to be used and potential hazards likely to be encountered on this Contract are detailed in the Project Specifications, Schedule of Quantity and Drawings, as well as in the Employers' Health and Safety Specifications (regulation 5(1)) of the Construction Regulations 2014.

The Contractor shall in terms of regulation 6(1) provide a comprehensive health and safety plan detailing his proposed compliance with the regulations, for approval by the Employer.

The Contractor shall at all times be responsible for full compliance with the approved plan as well as the Construction Regulations and no extension of time will be considered for delays due to non-compliance with the abovementioned plan or regulations.

Payment items are included in the Schedule of Quantities to cover the Contractor's cost for compliance with the OHS Act and the abovementioned regulations.

C3.6.2 PROTECTION OF THE PUBLIC

The site is accessible to the general public. The Contractor shall ensure that all personnel entering the construction site is fully informed about the dangers, dos and don’ts on the site. The Contractor shall ensure that non-construction personnel are protected within the guidelines of the OH&S Regulations.

C3.6.3 BARRICADES AND LIGHTING

All excavations, into which a person may fall, shall be securely barricaded at all times in accordance with the requirements of the applicable OH&S Regulations.

C3.6.4 TRAFFIC CONTROL ON ROADS

The Safety Officer shall take full responsibility for the traffic control in and around the site. The personnel on site shall be fully informed and trained by the Safety Officer regarding the construction traffic and general traffic control.

C3.6.5 MEASURES AGAINST DISEASE AND EPIDEMICS

No specific measures have to be taken against disease and epidemics on site.

C3.6.6 AIDS AWARENESS

All construction personnel shall be given an Aids Awareness briefing session by the Safety Officer.

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

PART C4 SITE INFORMATION

PART C4: SITE INFORMATION

CONTENTS

C4.1 NATURE OF GROUND AND SUBSOIL CONDITIONS

C4.1.1 NATURE OF GROUND

The area is underlain with *Kaap Valley Granite* and *Belvue Road Formation* chert and shale.

Hard rock and boulder excavation will be encountered during trench excavation. Clay could be encountered in pockets.

The onus rests with the Contractor to acquaint him/her with the nature of the ground for construction purposes.

C4.1.2 SUBSOIL CONDITIONS

Subsoil water (seepage) will be experienced during trench excavation, especially when left open for a long period.

The inflow of surface water from surrounding area is possible and the Contractor must make provision for the 'handling' of the seepage and surface water on a continuous basis until completion of the project.

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

APPENDIX A: OCCUPATIONAL HEALTH AND SAFETY SPECIFICATIONS

OCCUPATIONAL HEALTH AND SAFETY SPECIFICATIONS

CONTENTS

PARTICULAR SPECIFICATIONS

SECTION OHS: OHSA 1993: HEALTH AND SAFETY SPECIFICATION

OHS 1 SCOPE

This specification covers the health and safety requirements to be met by the Contractor to ensure a continued safe and healthy environment for all workers, employees and subcontractors under his control and for all other persons entering the site of works.

This specification shall be read with the Occupational Health and Safety Act (Act No 85 and amendment Act No 181) 1993, and the corresponding Construction Regulations 2014, and all other safety codes and specifications referred to in the said Construction Regulations **and the COVID-19 Occupational Health and Safety Measures in Workplaces, COVID-19(C19 OHS), 2020**.

In terms of the OHSA Agreement in Section (C1.4) of the Contract document, the status of the Contractor as mandatory to the Employer (client) is that of an employer in his own right, responsible to comply with all provisions of OHSA 1993, the Construction Regulations 2014 and **COVID-19(C19 OHS), 2020**.

This safety specification and the Contractor's own Safety Plan, the Construction Regulations 2014 as well as **COVID-19(C19 OHS), 2020**, shall be displayed on site or made available for inspection by all workers, employees, inspectors and any other persons entering the site of works.

The following are possible risks associated with this project:

- Please insert the risks associated with the project here

Additional risks may arise from specific methods of construction selected by the Contractor which are not necessary covered in the above.

OHS 2 DEFINITIONS

For the purpose of this contract the following shall apply:

Employer" where used in the contract documents and in this specification, means the Employer as defined in the General Conditions of Contract and it shall have the exact same meaning as "**client**" as defined in the Construction Regulations 2014. "**Employer**" and "**client**" is therefore interchangeable and shall be read in the context of the relevant document.

(a) "**Contractor**" wherever used in the contract documents and in this specification, shall have the same meaning as "**Contractor**" as defined in the General Conditions of Contract.

In this specification the terms "**principal contractor**" and "**contractor**" are replaced with "**Contractor**" and "**subcontractor**" respectively.

For the purpose of this contract the **Contractor** will, in terms of OHSA 1993, be the mandatory, without derogating from his status as an employer in his own right.

(b) "**Engineer**" where used in this specification, means the Engineer as defined in the General Conditions of Contract. In terms of the Construction Regulations the Engineer may act as agent on behalf of the Employer (the client as defined in the Construction Regulations).

OHS 3 TENDERS

The Contractor shall submit the following with his tender:

(a) a documented Health and Safety Plan as stipulated in Regulation 7 of the Construction Regulations. The Safety Plan must be based on the Construction Regulations 2014 and **COVID-19(C19 OHS), 2020** and will be subject to approval by the Employer;

(b) a declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Construction Regulations 2014;

(c) a declaration to the effect that he made provision in his tender for the cost of the health and safety measures envisaged in the Construction Regulations.

(d) Failure to submit the foregoing with his tender, will lead to the conclusion that the Contractor will not be able to carry out the work under the contract safely in accordance with the Construction Regulations.

OHS 4 NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK

After award of the contract, but before commencement of construction work, the Contractor shall, in terms of Regulation 3, notify the Provincial Director of the Department of Labour in writing if the following work is involved:

(a) the demolition of structures and dismantling of fixed plant of height of 3,0m or more;

(b) the use of explosives;

(c) construction work that will exceed 30 days or 300 person-days;

(e) excavation work deeper than 1,0m; or

(f) working at a height greater than 3,0m above ground or landings.

The notification must be done in the form of the pro forma included under Section T2 (Forms to be Completed by Tenderer) of the tender document.

A copy of the notification form must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site.

OHS 5 RISK ASSESSMENT

Before commencement of any construction work during the construction period, the Contractor shall have a risk assessment performed and recorded in writing by a competent person. (Refer Regulation 9 of the Construction Regulations 2014).

The risk assessment shall identify and evaluate the risks and hazards that may be expected during the execution of the work under the contract, and it shall include a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards identified.

The risk assessment shall be available on site for inspection by inspectors, Employer, Engineer, subcontractors, employees, trade unions and health and safety committee members, and must be monitored and reviewed periodically by the Contractor.

OHS 6 APPOINTMENT OF EMPLOYEES AND SUBCONTRACTORS

6.1 Health and Safety plan

The Contractor shall appoint his employees and any subcontractors to be employed on the contract, in writing, and he shall provide them with a copy of his documented Health and Safety Plan, or relevant sections thereof. The Contractor shall ensure that all subcontractors and employees are committed to the implementation of his Safety Plan.

6.2 Health and safety induction training

The Contractor shall ensure that all employees under his control, including subcontractors and their employees, undergo a health and safety induction training course by a competent person before commencement of construction work. No visitor or other person shall be allowed or permitted to enter the site of the works unless such person has undergone health and safety training pertaining to hazards prevalent on site.

The Contractor shall ensure that every employee on site shall at all times be in possession of proof of the health and safety induction training issued by a competent person prior to commencement of construction work.

OHS 7 APPOINTMENT OF SAFETY PERSONNEL

7.1 Construction Supervisor

The Contractor shall appoint a full-time **Construction Supervisor** with the duty of supervising the performance of the construction work.

He may also have to appoint one or more competent employees to assist the construction supervisor where justified by the scope and complexity of the works.

7.2 Construction safety officer

Taking into consideration the size of the project and the hazards or dangers that can be expected, the Contractor shall appoint in writing a full-time or part-time **Construction Safety Officer** if so decided by the client. The Safety Officer shall have the necessary competence and resources to perform his duties diligently.

Provision shall be made by the Contractor in his rates, to cover the cost of this dedicated construction safety officer appointed after award of the contract.

7.3 Health and safety representatives

In terms of **Section 17 and 18 of the Act (OHSA 1993)** the Contractor, being the employer in terms of the Act for the execution of the contract, shall appoint a **health and safety representative** whenever he has more than 20 employees in his employment on the site of the works. The health and safety representative must be selected from employees who are employed in a full-time capacity at a specific workplace.

The number of health and safety representatives for a workplace shall be at least one for every 100 employees.

The function of health and safety representative(s) will be to review the effectiveness of health and safety measures, to identify potential hazards and major incidents, to examine causes of incidents (in collaboration with his employer, the Contractor), to investigate complaints by employees relating to health and safety at work, to make representations to the employer (Contractor) or inspector on general matters affecting the health and safety of employees, to inspect the workplace, plant, machinery etc. on a regular base, to participate in consultations with inspectors and to attend meetings of the health and safety committee.

7.4 Health and safety committee

In terms of Sections **17 and 18 of the Act (OHSA 1993)** the Contractor (as employer), shall establish one or more **health and safety committee(s)** where there are two or more health and safety representatives at a workplace. The persons selected by the Contractor to serve on the committee shall be designated in writing.

The function of the health and safety committee shall be to hold meetings at regular intervals, but at least once every three months, to review the health and safety measures on the contract, to discuss incidents related to health and safety with the Contractor and the inspector, and to make recommendations regarding health and safety to the Contractor and to keep record of

recommendations and reports made by the committee.

7.5 Competent persons

In accordance with the Construction Regulations the Contractor has to appoint in writing **competent persons** responsible for supervising construction work on each of the following work situations that may be expected on the site of the works.

(a) Risk assessment and induction training as described in Regulation 9 of the Construction Regulations;

(b) Fall protection as described in Regulation 10;

(c) Structures described in Regulation 11;

(d) Temporary works described in Regulation 12;

(e) Excavation described in Regulation 13;

(f) Demolition work described in Regulation 14;

(g) Tunneling as described in Regulation 15;

(h) Scaffolding as described in Regulation 16;

(i) Suspended platforms as described in Regulation 17;

(j) Rope Access Work as described in Regulation 18;

(k) Material hoists as described in Regulation 19;

(l) Bulk mixing plant as described in Regulation 20;

(m) Explosive actuated fastening device as described in Regulation 21;

(n) Cranes as described in Regulation 22;

(o) Construction vehicle and mobile as described in Regulation 23;

(p) Electrical installations and machinery of construction sites as described in Regulation 24;

(q) Use and temporary storage of flammable liquids on construction sites as described in Regulation 25;

(r) Water environments as described in Regulation 26;

(s) Housekeeping and general safeguarding on construction sites as described in Regulation 27;

(t) Stacking and storage on construction sites as described in Regulation 28;

(u) Fire precautions on construction sites as described in Regulation 29, and

(s) Construction employees' facilities as described in Regulation 30.

A competent person may be appointed for more than one part of the construction work with the understanding that the person must be suitably qualified and able to supervise at the same time the construction work on all the work situations for which he has been appointed.

The appointment of competent persons to supervise parts of the construction work does not relieve the Contractor from any of his responsibilities to comply with **all** requirements of the Construction Regulations.

OHS 8 RECORDS AND REGISTERS

In accordance with the Construction Regulations the Contractor is bound to keep records and registers related to health and safety on site for periodic inspection by inspectors, the Engineer, the Employer, trade union officials and subcontractors and employees. The following records and registers must be kept on site and shall be available for inspection at all times.

(a) A copy of the OHSA 1993 Construction Regulations 2014;

(b) A copy of this Health and Safety Specification;

(c) A copy of the Contractor's Health and Safety Plan (Regulation 7);

(d) A copy of the Notification of Construction Work (Regulation 4);

(e) A health and safety file in terms of Regulation 5(1)(b) with inputs by the Construction Safety Officer (Regulation 7(1));

(f) A copy of the risk assessment described in Regulation 9;

(g) A full protection plan and the corresponding records of evaluation and training of employees working from elevated positions as described in Regulation 10;

(h) Drawings pertaining to the design of structures (Regulation 11(1)(c)) and formwork and support work structures (Regulation 12) must be kept on site;

(i) Pronouncement of the safety of excavations must be recorded in a register to be kept on site (Regulation 13);

(j) A copy of the certificate of the system design for suspended platforms (Regulation 17(2)(b));

(k) A notice must be affixed around the base towers of material hoists to indicate the maximum mass load, which may be carried at any one time by material hoists (Regulation 19(5));

(l) Maintenance records of material hoists and inspection results must be kept in a record book to be kept on site (Regulation 19(8));

(m) A record of any repairs to or maintenance of a batch plant must be kept on site (Regulations 20(8));

(n) A warning notice must be displayed in a conspicuous manner when and wherever an explosive powered tool is used (Regulation 19(2));

(o) A register for recording of findings by the competent person appointed to inspect construction vehicles and mobile plant (Regulation 23(1)(k)).

OHS 9 CONTRACTORS RESPONSIBILITIES

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHSA 1993), which means that the Contractor has the status of employer in his own right in respect of the contract. The Contractor is therefore responsible for all the duties and obligations of an employer as set out in the Act (OHSA 1993) and the Construction Regulations 2014.

Before commencement of work under the contract, the Contractor shall enter into an agreement with the Employer (Client) to confirm his status as mandatory (employer) for the contract under consideration.

The Contractor's duties and responsibilities are clearly set out in the Construction Regulations 2014 and are not repeated in detail but some important aspects are highlighted hereafter, without relieving the Contractor of any of his duties and responsibilities in terms of the Construction Regulations.

(a) Contractor's position in relation to the Employer (Client) (Regulation 5)

In accordance with Section 4 of the Regulations, the Contractor shall liaise closely with the Employer or the Engineer on behalf of the Employer, to ensure that all requirements of the Act and the Regulations are met and complied with.

(b) The Principal Contractor and Contractor (Regulation 7)

The Contractor is in terms of the definition in Regulation 1 the equivalent of Principle Contractor as defined in the Construction Regulations, and he shall comply with all the provisions of Regulation 7.

Any subcontractors employed by the Contractor must be appointed in writing, setting out the terms of the appointment in respect of health and safety. An independent subcontractor shall however provide and demonstrate to the Contractor a suitable, acceptable and sufficiently documented health and safety plan before commencement of the subcontract. In the absence of such a health and safety plan the subcontractor shall undertake in writing that he will comply with the Contractor's safety plan, the health and safety specifications of the Employer and the Construction Regulations 2014.

(c) Supervision of construction work (Regulation 8)

The Contractor shall appoint the safety and other personnel and employees as required in terms of Regulation 7 and as set out in OHS 7 above. Appointment of those personnel and employees does not relieve the Contractor from any of the obligations under Regulation 7.

(d) Risk assessment (Regulation 9)

The Contractor shall have the risk assessment made as set out in paragraph 7 above before commencement of the work and it must be available on site for inspection at all times. The Contractor shall consult with the health and safety committee or health and safety representative(s) etc. on a regular basis to ensure that all employees, including subcontractors under his control, are informed and trained by a competent person regarding health hazards and related work procedures.

No subcontractor, employee or visitor shall be allowed to enter the site of works without prior health and safety induction training, all as specified in Regulation 7.

(e) Fall protection (Regulation 10)

Fall protection, if applicable to this contract shall comply in all respects with Regulation 8 of the Construction Regulations.

(f) Structures (Regulation 11)

The Contractor will be liable for all claims arising from collapse or failure of structures if he failed to comply with all the specifications, project specifications and drawings related to the structures, unless it can be proved that such collapse or failure can be attributed to faulty design or insufficient design standards on which the specifications and the drawings are based.
In addition, the Contractor shall comply with all aspects of Regulation 11 of the Construction Regulations.

(g) Temporary works (Regulation 12)

The Contractor will be responsible for the adequate design of all formwork and support structures by a competent person.
All drawings pertaining to formwork shall be kept on site and all equipment and materials used in formwork, shall be carefully examined and checked for suitability by a competent person.

The provisions of Regulation 12 of the Construction Regulations shall be followed in every detail.

(h) Excavation work (Regulation 13)

It is essential that the Contractor shall follow the instructions and precautions in the Standard Specifications and Project Specifications as well as the provisions of the Construction Regulations to the letter as unsafe excavations can be a major hazard on any construction site. The Contractor shall therefore ensure that all excavation work is carried out under the supervision of a competent person, that inspections are carried out by a Professional Engineer or Technologist, and that all work is done in such a manner that no hazards are created by unsafe excavations and working conditions.

Supervision by a competent person will not relieve the Contractor from any of his duties and responsibilities under Regulation 13 of the Construction Regulations.

(i) Demolition work (Regulation 14)

Whenever demolition work is included in a contract, the Contractor shall comply with all the requirements of Regulation 14 of the Construction Regulations. The fact that a competent person has to be appointed by the Contractor does not relieve the Contractor from any of his responsibilities in respect of safety of demolition work.

(j) Tunneling (Regulation 15)

The Contractor shall comply with Regulation 15 wherever tunneling of any kind is involved.

(k) Scaffolding (Regulation 16)

The Contractor shall ensure that all the provisions of Regulation 16 of the Construction Regulations are complied with. [Note: Reference in the Regulations to “Section 44 of the Act” should read “Section 43 of the Act”].

(l) Suspended platforms (Regulation 17)

Wherever suspended platforms will be necessary on any contract, the Contractor shall ensure that copies of the system design issued by a Professional Engineer are submitted to the Engineer for inspection and approval. The Contractor shall appoint competent persons as supervisors and competent scaffold erectors, operators and inspectors and ensure that all work related to suspended platforms are done in accordance with Regulation 17 of the Construction Regulations.

(m) Rope Access Work (Regulation 18)

Where rope access work is required on the construction site, the Contractor shall comply with Regulation 18.

(n) Material Hoists (Regulation 19)

Wherever applicable, the Contractor shall comply with the provisions of Regulation 19 to the letter.

(o) Batch plants (Regulation 20)

Wherever applicable, the Contractor shall ensure that all lifting machines, lifting tackle, conveyors, etc. used in the operation of a batch plant shall comply with, and that all operators, supervisors and employees are strictly held to the provisions of Regulation
20. The Contractor shall ensure that the General Safety Regulations (2003), the Driven Machinery Regulations (Government Notice R295 of 26/2/1988) and the Electrical Installation Regulations (Government Notice R2271 of 11/10/1995) are adhered to by all involved.

In terms of the Regulations, records of repairs and maintenance shall be kept on site.

(p) Explosive powered tools (Regulation 21)

The Contractor shall ensure that, wherever explosive-powered tools are required to be used, all safety provisions of Regulation 21 are complied with.

It is especially important that warning notices are displayed and that the issue and return of cartridges and spent cartridges be recorded in a register to be kept on site.

(q) Cranes (Regulation 22)

Wherever the use of tower cranes becomes necessary, the provisions of Regulation 20 shall be complied with.

(r) Construction vehicles and mobile plant (Regulation 23)

The Contractor shall ensure that all construction vehicles and plant are in good working condition and safe for use, and that they are used in accordance with their design and intended use. The vehicles and plant shall only be operated by workers or operators who have received appropriate training, all in accordance with all the requirements of Regulation 23.

All vehicles and plant must be inspected on a daily basis, prior to use, by a competent person and the findings must be recorded in a register to be kept on site.

(s) Electrical installation and machinery on construction sites (Regulation 24)

The Contractor shall comply with the Electrical Installation Regulations (Government Notice R2920 of 23 October 1992) and the Electrical Machinery Regulations (Government Notice R1953 of 12 August 1993). Before commencement of construction, the Contractor shall take adequate steps to ascertain the presence of, and guard against dangers and hazards due to electrical cables and apparatus under, over or on the site.

All temporary electrical installations on the site shall be under the control of a competent person, without relieving the Contractor of his responsibility for the health and safety of all workers and persons on site in terms of Regulation 24.

(t) Use of temporary storage of flammable liquids on construction sites (Regulation 25)

The Contractor shall comply with the provisions of the General Safety Regulations (2003) and all the provisions of Regulation 25 of the Construction Regulations to ensure a safe and hazard-free environment to all workers and other persons on site.

(u) Water environments (Regulation 26)

Where construction work is done over or in close proximity to water, the provisions of Regulation 26 shall apply.

(v) Housekeeping on Construction sites (Regulation 27)

Housekeeping on all construction sites shall be in accordance with the provisions of the environment Regulations for workplaces (Government Notice R2281 of 16 October 1987) and all the provisions of Regulation 27 of the Construction Regulations.

(w) Stacking and storage on construction sites (Regulation 28)

The provisions for the stacking of articles contained in the General Safety Regulations (2003) as well as all the provisions Regulation 28 of the Construction Regulations shall apply.

(x) Fire precautions on construction sites (Regulation 29)

The provisions of the Environmental Regulations for Workplaces (Government Notice R2281 of 16 October 1987) shall apply.

In addition, the necessary precautions shall be taken to prevent the incidence of fires, to provide adequate and sufficient fire protection equipment, sirens, escape routes etc. all in accordance with Regulation 29 of the Construction Regulations.

(y) Construction employees' facilities (Regulation 30)

The Contractor shall comply with the construction site provisions as in the Facilities Regulations (2004), the provisions of Regulation 30 of the Construction Regulations and **the COVID-19 Occupational Health and Safety Measures in Workplaces COVID-19 (C19 OHS), 2020.**

(z) Non-compliance with the Construction Regulations 2014

The foregoing is a summary of parts of the Construction Regulations applicable to all construction projects.

The Contractor, as employer for the execution of the contract, shall ensure that all provisions of the Construction Regulations and **the COVID-19 Measures in Workplaces** applicable to the contract under consideration are complied with to the letter.

Should the Contractor fail to comply with the provisions of the Regulations 3 to 30 as listed in

Regulation 33 **and COVID-19 (C19 OHS),2020,** he will be guilty of an offence and will be liable, upon conviction, to the fines or imprisonment as set out in Regulation 33.

***The Contractor is advised in his own interest to make a careful study of the Act, the Construction Regulations and the COVID-19 (C19 OHS),2020 as ignorance of the Act and the Regulations will not be accepted in any proceedings related to non-conformance to the Act and the Regulations*.**

OHS 10 MEASUREMENT AND PAYMENT

10.1 Principles

It is a condition of this contract that Contractors, who submit tenders for this contract, shall make provision in their tenders for the cost of all health and safety measures during the construction process. All associated activities and expenditure are deemed to be included in the Contractor's tendered rates and prices.

(a) Safety personnel

The Construction Supervisor, the Construction Safety Officer, Health and Safety Representatives, Health and Safety Committee and Competent Persons referred to in clauses 7.1 to 7.5 shall be members of the Contractor's personnel, and no additional payment will be made for the appointment of such safety personnel.

(b) Records and Registers

The keeping of health and safety-related records and registers as described in paragraph 8 is regarded as a normal duty of the Contractor for which no additional payment will be considered, and which is deemed to be included in the Contractor's tendered rates and prices.

AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT NO 85 OF 1993

THIS AGREEMENT is made between.....

(hereinafter called the EMPLOYER of the one part, herein represented by:

……
…
……
…
……
…
……

in his capacity as:

……..

AND:

(hereinafter called the CONTRACTOR) of the other part, herein represented by

……
…
……
…
……
…
……

in his capacity as:

…….. duly

authorized to sign on behalf of the Contractor.

WHEREAS the CONTRACTOR is the Mandatory of the EMPLOYER in consequence of an agreement between the CONTRACTOR and the EMPLOYER in respect of

CONTRACT:.....

AND WHEREAS the EMPLOYER and the CONTRACTOR have agreed to enter into an agreement in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act No 85 of 1993, as amended by OHSA Amendment Act No 181/1993 (hereinafter referred to as the ACT);

NOW THEREFORE the parties agree as follows:

1. **The CONTRACTOR undertakes to acquaint the appropriate officials and employees of the CONTRACTOR with all relevant provisions of the ACT and the regulations promulgated in terms thereof.**

2. The CONTRACTOR undertakes to fully comply with all relevant duties, obligations and prohibitions imposed in terms of the ACT and Regulations: Provided that should the EMPLOYER have prescribed certain arrangements and procedures that same shall be observed and adhered to by the CONTRACTOR, his officials and employees. The CONTRACTOR shall bear the onus of acquainting himself/herself/itself with such arrangements and procedures.

3. The CONTRACTOR hereby accepts sole liability for such due compliance with the relevant duties, obligations, prohibitions, arrangements and procedures, if any, imposed by the ACT and Regulations, and the CONTRACTOR expressly absolves the EMPLOYER and the Employer's CONSULTING ENGINEERS from being obliged to comply with any of the aforesaid duties, obligations, prohibitions, arrangements and procedures in respect of the work included in the contract.

4. The CONTRACTOR agrees that any duly authorised officials of the EMPLOYER shall be entitled, although not obliged, to take such steps as may be necessary to ensure that the CONTRACTOR has complied with his undertakings as more fully set out in paragraphs 1 and 2 above, which steps may include, but shall not be limited to, the right to inspect any appropriate site or premises occupied by the CONTRACTOR, or to take such steps it may deem necessary to remedy the default of the CONTRACTOR at the cost of the CONTRACTOR.

5. The CONTRACTOR shall be obliged to report forthwith to the EMPLOYER any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the ACT and Regulations, pursuant to work performed in terms of this agreement, and shall, on written demand, provide full details in writing of such investigation, complaint or criminal charge.

Thus signed at .....for and on behalf of the **CONTRACTOR**

on this the …… day of ……..……..…… 20……

SIGNATURE: .....

NAME AND SURNAME: .....

CAPACITY: .....

WITNESSES: 1. .....

2. .....

Thus signed at .....for and on behalf of the **EMPLOYER** on this

the …….. day of ……..…… 20……

SIGNATURE: .....

NAME AND SURNAME: .....

CAPACITY: .....

WITNESSES: 1. .....

2. .....

CONTRACTOR'S HEALTH AND SAFETY DECLARATION

In terms of Clause 4(4) of the OHSA 1993 Construction Regulations 2014 (referred to as "the Regulations" hereafter), a Contractor may only be appointed to perform construction work if the Employer is satisfied that the Contractor has the necessary competencies and resources to carry out the work safely in accordance with the Occupational Health and Safety Act No 85 of 1993 and the OHSA 1993 Construction Regulations 2014.

To that effect a person duly authorised by the tenderer must complete and sign the declaration hereafter in detail.

Declaration by Tenderer

1. I the undersigned hereby declare and confirm that I am fully conversant with the Occupational Health and Safety Act No 85 of 1993 (as amended by the Occupational Health and Safety Amendment Act No 181 of 1993), and the OHSA 1993 Construction Regulations 2014.

2. I hereby declare that my company has the competence and the necessary resources to safely carry out the construction work under this contract in compliance with the Construction Regulations and the Employer's Health and Safety Specifications.

3. I propose to achieve compliance with the Regulations by one of the following:

(a) From my own competent resources as detailed in 4(a) hereafter:.....***Yes / No**

(b) From my own resources still to be appointed or trained until competency is achieved, as detailed in 4(b) hereafter: .....***Yes / No**

(c) From outside sources by appointment of competent specialist subcontractors as detailed in 4(c) hereafter:.....***Yes / No**

(***** = *delete whatever is not applicable*)

4. Details of resources I propose:

(Note: Competent resources shall include safety personnel such as a construction supervisor and construction safety officer as defined in Regulation 8, and competent persons as defined in Regulations 9-29, (all or individual regulations) as applicable to this contract)

(a) Details of the competent and qualified key persons from my company's own resources, who will form part of the contract team:

NAMES OF COMPETENT PERSONS	POSITIONS TO BE FILLED BY COMPETENT PERSONS

(b) Details of training of persons from my company's own resources (or to be hired) who still have to be trained to achieve the necessary competency:

(i) By whom will training be provided? .....

(ii) When will training be undertaken? .....

(iii) List the positions to be filled by persons to be trained or hired: .....

.....

.....

(c) Details of competent resources to be appointed as subcontractors if competent persons cannot be supplied from own company:

Name of proposed subcontractor: .....

Qualifications or details of competency of the subcontractor: .....

5. I hereby undertake, if my tender is accepted, to provide, before commencement of the works under the contract, a suitable and sufficiently documented Health and Safety Plan in accordance with Regulation 7(1) of the Construction Regulations, which plan shall be subject to approval by the Employer.

6. I confirm that copies of my company's approved Health and Safety Plan, the Employer's Safety Specifications as well as the OHSA 1993 Construction Regulations 2014 will be provided on site and will at all times be available for inspection by the Contractor's personnel, the Employer's personnel, the Engineer, visitors, and officials and inspectors of the Department of Labour.

7. I hereby confirm that adequate provision has been made in my tendered rates and prices in the schedule of quantities to cover the cost of all resources, actions, training and all health and safety measures envisaged in the OHSA 1993 Construction Regulations 2014, and that I will be liable for any penalties that may be applied by the Employer in terms of the said Regulations (Regulation 33) for failure on the Contractor's part to comply with the provisions of the Act and the Regulations.

8. I agree that my failure to complete and execute this declaration to the satisfaction of the Employer will mean that I am unable to comply with the requirements of the OHSA 1993 Construction Regulations 2014, and accept that my tender will be prejudiced and may be rejected at the discretion of the Employer.

SIGNATURE: ..... DATE: .....….....

(of person authorised to sign on behalf of the Tenderer)

PRO FORMA NOTIFICATION FORM IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT 1993, CONSTRUCTION REGULATIONS 2014

[This form must be completed and forwarded, prior to commencement of work on site, by all Contractors that qualify in terms of Regulation 3 of the Construction Regulations 2014, to the office of the Department of Labour]

NOTIFICATION OF CONSTRUCTION WORK

1. (a) Name and postal address of principal contractor.

(b) Name and tel. pf principal contractor's contact person:

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2. Principal contactor's compensation registration number:

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3. (a) Name and postal address of client :

(b) Name and tel. no of clients contact person or agent:

---

4 (a) Name and postal address of designer (s) for the project:

(b) ---

5. Name and telephone number of principal contractor's sub- ordinate supervisor on site appointed in terms of Regulation 8 (1).

-

6. Name /s of principal contractor's sub- ordinate supervisor on sire appointed in terms of Regulation 8 (2)

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7. Exact physical address of the construction site or site office:

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8. Nature of the construction work:

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9. Expected commencement date:

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10. Expected completion date:

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11. Estimated maximum number of persons on the construction site.

Total:_____Male:_____Female
_____

12. Planned number of contractors on the construction:

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13. Name (s) of contractors already selected.

Principal Contractor	Date
Client's Agent (where applicable)	Date
Client	Date

CITY OF MBOMBELA

DEPARTMENT NAME: TECHNICAL SERVICES

CONTRACT NO: COM46/2023

FOR

UPGRADING OF MLAMBONGWANE WATER SUPPLY SCHEME

APPENDIX B: DRAWINGS FOR TENDER PURPOSES