



**PART A
INVITATION TO BID**

MBD1

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE (NAME OF MUNICIPALITY/ MUNICIPAL ENTITY)					
BID NUMBER:	PM47/2023	CLOSING DATE:	18 MARCH 2024	CLOSING TIME:	10H00
DESCRIPTION	ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE				
THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (MBD7).					
BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT Polokwane Municipality, Civic Centre, corner Bondenstein and Landdros Mare Street not later than 10:00 on 18 MARCH 2024 .					
No compulsory site inspection will be held					
The Bid box is generally open 24 hours, 7 days a week.					
Completed Bid document, fully priced and signed must be sealed in an envelope marked " Bid number and Bid description"					
Bidders should ensure that bids are delivered timeously to the correct address. If the bid is late, it will not be accepted for consideration.					
Bids documents containing the Conditions of Bid and other requirements in terms of the Supply Chain Management Policy will be downloaded from e-tender Publication Portal at www.etenders.gov.za at no fee.					
SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
TAX COMPLIANCE STATUS	TCS PIN:		OR	CSD No:	
ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES OFFERED?	☐ Yes ☐ No [IF YES ENCLOSE PROOF]		ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES OFFERED?	☐ Yes ☐ No [IF YES, ANSWER PART B:3]	
TOTAL NUMBER OF ITEMS OFFERED			TOTAL BID PRICE	R	
MINIMUM WORK OPPORTUNITIES TO BE CREATED	80		CIDB GRADING	8GB OR HIGHER	
SIGNATURE OF BIDDER	.....		DATE		
CAPACITY UNDER WHICH THIS BID IS SIGNED					
BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:			TECHNICAL INFORMATION MAY BE DIRECTED TO:		
DEPARTMENT	SUPPLY CHAIN		CONTACT PERSON	MANTLAKO SEBAKA/ Mr MASHILO SEKIBA	
CONTACT PERSON	SIBONGILE MADISHA		TELEPHONE NUMBER	015 290 2751/015 290 2202	
TELEPHONE NUMBER	015 023 5056		FACSIMILE NUMBER		
FACSIMILE NUMBER			E-MAIL ADDRESS	mantlakoS@polokwane.gov.za/ mashiloS@polokwane.gov.za	
E-MAIL ADDRESS					

PART B TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:	
1.1.	BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
1.2.	ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED (NOT TO BE RE-TYPED) OR ONLINE
1.3.	THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
2. TAX COMPLIANCE REQUIREMENTS	
2.1	BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
2.2	BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.
2.3	APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.
2.4	FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.
2.5	BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
2.6	IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
2.7	WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS	
3.1.	IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES
	☐ NO
3.2.	DOES THE ENTITY HAVE A BRANCH IN THE RSA? ☐ YES ☐ NO
3.3.	DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? ☐ YES
	☐ NO
3.4.	DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? ☐ YES
	☐ NO
3.5.	IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? ☐ YES
	☐ NO
IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.	

**NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.
NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.**

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:

DATE:

POLOKWANE MUNICIPALITY

CONTENTS OF TENDER DOCUMENTATION

Volume 1: Tender requirements, Contract and Pricing Data		
Number	Heading	Colour
Part T1: Tendering procedures		
T1.1	Tender Notice and Invitation to Tender	White
T1.2	Tender Data	Pink
T1.3	Standard and Particular Conditions of Tender	Pink
Part T2: Returnable Documents		
T2.1	List of Returnable Documents	Yellow
T2.2	Returnable Schedules	Yellow
Part C1: Agreements and Contract Data		
C1.1	Form of Offer and Acceptance	White
C1.2	Contract Data	White
C1.3	Demand Guarantee and Retention Money Guarantee	White
C1.4	Occupational Health and Safety Agreement	White
C1.5	Agreement with adjudicators	White
Part C2: Pricing data		
C2.1	Pricing Instructions	Yellow
C2.2	Bill of Quantities	Yellow
Part C3: Scope of Work		
C3.1	Description of The Works	Blue
C3.2	Standard Specification	Blue
C3.3	Project Specification	Blue
Part C4: Site information		
C4.1	Locality Plan	Green
C4.2	Bid Drawings	White

	BID NOTICE
	RESPONSIVENESS AND EVALUATION CRITERIA
FORM "A"	BID FORM
FORM "B"	GENERAL UNDERTAKING BY THE BIDDER
FORM "C"	GENERAL CONDITIONS OF CONTRACT
FORM "D"	GENERAL PROCEDURES
SBD 5	NATIONAL INDUSTRIAL PARTICIPATION PROGRAMME
MBD 5	DECLARATION FOR PROCUREMENT ABOVE R10 MILLION
MBD 6.2	DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT
MBD 8	DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES
FORM "E"	SPECIAL CONDITIONS OF CONTRACT (IF ANY)
FORM "F"	BID SPECIFICATIONS
MBD 3.1	SCHEDULE OF PRICES
MBD 6.1	PREFERENTIAL PROCUREMENT FORM
ANNEXURE "A"	<i>EVALUATION PROCESS AND CRITERIA</i>
ANNEXURE "B"	DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES
MBD 4	DECLARATION OF INTEREST
ANNEXURE "C"	CERTIFICATE FOR MUNICIPAL SERVICES AND PAYMENTS
ANNEXURE "D"	AUTHORISATION FOR DEDUCTION OF OUTSTANDING AMOUNTS OWED TO COUNCIL
MBD 9	CERTIFICATE OF INDEPENDENT DIB DETERMINATION

**T1.1 Tender Notice and
BID PM47/2023:**

Invitation to Tender



DIRECTORATE: COMMUNITY SERVICES

BUSINESS UNIT: SPORT AND RECREATION

Bids are hereby invited for the **Allocation of work for completion of outstanding work for the project on the construction of new international softball stadium in Polokwane.**

Bidders should ensure that bids are delivered timeously to the correct address. If the bid is late, it will not be accepted for consideration

THIS BID IS SUBJECT TO THE, PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATION, 2022, AND THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

The Municipality shall adjudicate and award bids in accordance with preference points of **90/10**-point system, **90** points for the price and **10** points for specific goals. Prospective bidders must accept that the bid will be adjudicated, according to the said legislation. Bids will remain valid for 90 (ninety) days. The Council also reserves the right to negotiate further conditions and requirements with the successful bidder

N.B: NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE [AS DEFINED IN REGULATION 1 OF THE LOCAL GOVERNMENT: MUNICIPAL SUPPLY CHAINS MANAGEMENT REGULATIONS]

**MS. THUSO NEMUGUMONI
MUNICIPAL MANAGER
CIVIC CENTRE
LANDDROS MARE STREET**

RESPONSIVENESS AND EVALUATION CRITERIA

1. RESPONSIVENESS CRITERIA

The Polokwane Municipality will consider no Bid unless it meets the following responsiveness criteria:

- The bid must be properly received in a sealed envelope clearly indicating the description of the service and the bid number for which the bid is submitted.
- The bid must be deposited in the relevant bid box as indicated on the notice of the bid on or before the closing date and time of the bid.
- A valid CSD number must be submitted with the bid on or before the closing time and date of the bid.
- Copy of the company registration certificate must be submitted with the bid on or before the closing time and date of the bid.
- Submission of a Joint Venture Agreement, where applicable, which has been properly signed by all parties.
- Proof of payment of Municipal Rates and Taxes or letter for Tribal Authority or lease agreement must be attached.
- Complies with the requirements of the bid and technical specifications.
- Registered in the relevant contractor category in the Construction Industry Development Board Register of Contractors (CIDB).
- Adheres to Pricing Instructions.
- Financial ability to execute the contract.
- Comply in full and observe the requirements of the Notice to Bidders.
- Experience with similar work – demonstrate a track record of a similar scope and size

2. EVALUATION OF BIDS

- a) All bids received shall be evaluated in terms of the Supply Chain Management Regulations, Polokwane Municipality Supply Chain Management Policy (on request from Municipality), and other applicable legislations.
- b) The Council reserves the right to accept all, some, or none of the bids submitted – either wholly or in part – and it is not obliged to accept the lowest bid.

By submitting this bid, bidder authorizes the Council or its delegate(s) to carry out any investigation deemed necessary to verify the correctness of the statements and documents submitted and that such documents reasonably reflect the ability of the Bidder to provide the goods and services required by the Council.

PLEASE NOTE

- 1. The Municipal Manager may cancel a contract awarded to a person if:**
 - a) The person committed a corrupt or fraudulent act during the procurement process or in the execution of the contract, or
 - b) An official or other role player committed any corrupt or fraudulent act during the procurement process or in the execution of the contract that benefited that person.

- 2. The Municipal Manager may reject the bid or quote of any person if that person or any of its directors has:**
 - a) Failed to pay municipal rates and taxes or municipal service charges and such rates, taxes and charges are in arrears for more than three months;
 - b) Failed, during the last five years, to perform satisfactorily on a previous contract with the Polokwane Municipality or any other organ of State after written notice was given to that bidder that performance was unsatisfactory;
 - c) Abused the supply chain management system of the Municipality or have committed any improper conduct in relation to this system;
 - d) Been convicted of fraud or corruption during the past five years;
 - e) Wilfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or
 - f) Been listed in the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No. 12 of 2004) or has been listed on National Treasury's database as a person prohibited from doing business with public sector.

POLOKWANE MUNICIPALITY

T1.2 Tender Data

1. CONDITIONS OF TENDER

The conditions of tender are the Standard Conditions of Tender as contained in Annex F of the CIDB Standard for Uniformity in Construction Procurement (SFU) of May 2010, as published in Government Gazette No 33239, Board Notice 86 of 2010 of 28 May 2010. Those Standard Conditions of Tender remained the same as those published in the previous edition of the SFU as published in Government Gazette No 31823, Board Notice 12 of 2009 of 30 January 2009 - See www.cidb.org.za.

Each Tenderer shall obtain its own copy of the Standard Conditions of Tender.

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. In the interpretation of any ambiguity or inconsistency between the Tender Data and the Standard Conditions of Tender, the Tender Data shall have precedence.

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	Tender Data
2. <u>EMPLOYER</u> Cl. F1.1	The "Employer" is "Polokwane Municipality" The Employer's domicilium citandi et executandi (permanent physical business address) is: Polokwane Municipality, Civic Centre, Landdros Mare Street, Polokwane The Employer's address for communication relating to this project is: PO Box 111, Polokwane, 0700
3. <u>TENDER DOCUMENTS</u> Cl. F.1.2	"The following documents form part of this tender: VOLUME 1 Part T1 Tendering procedures T1.1 Tender notice and invitation to tender T1.2 Tender data T1.3 Standard and Particular conditions to tender Part T2 Returnable Documents T2.1 List of Returnable Documents T2.2 Returnable Schedules that will be incorporated into the Contract Part C1 Agreements and Contract Data C1.1 Form of offer and acceptance

Clause number	Tender Data
	C1.2 Contract data C1.3 Form for Adjudicators Appointment C1.4 Agreement in terms of Occupational Health and Safety Part C2 Pricing Data C2.1 Pricing Instructions C2.2 Bill of Quantities Part C3 Scope of Work C3.1 Description of the Works C3.2 List of Drawings C3.3 Procurement C3.4 Construction C3.5 Variations and Additions to SABS 1200 Standardized Specifications C3.6 Particular Specifications C3.7 Health and Safety Specifications C3.8 Environmental Management during Construction C3.9 Management of the Works Part C4 Site information VOLUME 2 Tender Drawings
4. <u>EMPLOYER'S AGENT</u> Cl. F.1.4	The Employer's agent's are: a) Principal Agent Makone Consulting Engineers (Pty) Ltd Physical Address: 33 Compensatie Street Portion 716 Polokwane, 0700 Tel.: (015) 290 4790 E-mail: info@makone.co.za Postal Address: PO BOX 1198 Fauna Park Polokwane Fax: (086) 621 2686
5. <u>TENDERER'S OBLIGATIONS</u>	
5.1. <u>Eligibility</u> <u>Cl. F.2.1</u>	A tender offer may only be submitted if the Tenderer satisfies the criteria stated in the Tender Data and if the Tenderer, or any of his principals, is not under any restriction to do business with the Employer.
5.2. <u>Site Visit and Clarification Meeting</u> Cl. F.2.7	No compulsory Site and Briefing meeting
5.3. <u>Insurance</u>	No insurance cover will be provided by the Employer.

Clause number	Tender Data
CI. F.2.9	
5.4. <u>Alternative Tender Offers</u> CI. F. 2.12	Unless anything to the contrary has been determined in the Contract Data, a Tenderer may, together with his tender for the original designs contained in the contract documents, submit alternative designs and tender offers for consideration. All designs, calculations, drawings and Operation and Maintenance manuals shall be fully endorsed by a third party registered engineer, accomplished in such specific field of practice and the cost thereof shall be borne solely by the Contractor. Such alternative designs and offers shall be subject to the following conditions and requirements: 5.4.1. <u>Tenders</u> An alternative offer or design will be considered only if the tender for the original items has been fully priced and completed. The alternative tender offer is to be submitted in the same envelope as the main tender offer, together with a schedule that compares the requirements of the tender documents with the alternative requirements the Tenderer proposes. No alternative tender will be considered unless a tender free from qualifications is also submitted. Unless the alternative offer stipulates to the contrary, it shall be assumed that the period for completion of the Works shall be the same as for the original design. Designs, calculations, drawings and a modified schedule of quantities (as determined hereafter) in respect of each alternative offer or design shall accompany the alternative tender offer and shall be endorsed fully by a third party registered engineer, accomplished in such specific field of practice. 5.4.2. <u>Preliminary calculations</u> Preliminary calculations for an alternative design shall be submitted with the tender. Such calculations shall give adequate details so as to enable an assessment to be made of the general efficacy of the design and of its principal elements, also of the degree to which the design prescriptions and codes of the Employer are being complied with. The calculations shall be clear and in a logical sequence and shall clearly reflect all the design assumptions. 5.4.3. <u>Preliminary drawings</u> Preliminary drawings of the alternative designs shall also be submitted with the tender. These drawings shall comprise adequate layout plans, elevations and sections and shall clearly illustrate the general efficacy of the design and its principal elements. 5.4.4. <u>Quantities</u>

Clause number	Tender Data
	Each alternative offer shall be accompanied by a modified priced schedule of quantities compiled in accordance with the specifications, in so far as it is applicable, which clearly shows the manner in which the price for the alternative offer has been determined and the items in the original schedule of quantities which fall away or are being changed. In addition to the schedule of quantities, a set of calculations shall be supplied to show how the quantities have been determined. All assumptions in regard to factors which will determine quantities shall be clearly and conspicuously marked by underlining or colouring, and shall indicate whether or not the assumptions have been based on information furnished in the Contract Data (with the necessary references). 5.4.5. <u>Further details</u> Should the Employer's Agent find that the calculations and drawings submitted for alternative designs are not complete enough for proper adjudication of the alternative designs, the Employer reserves to itself the right to call on the Tenderer to submit such further calculations and drawings as may be required. If such further details are not submitted within ten days of having been requested, the alternative designs will not be given further consideration. 5.4.6. <u>Preliminary adjudication of alternative designs</u> The Employer's Agent will undertake a preliminary scrutiny of any alternative designs for compliance with the specified requirements of the Employer. Should he find any mistakes or unsatisfactory aspects, he may afford the Bidder the opportunity to rectify them within a period to be determined by the Employer's Agent. However, it is emphasized that the preliminary scrutiny of the design and tender by the Employer's Agent, by its very nature, cannot be comprehensive, and no guarantee can be given in this regard that all the mistakes made by the Bidder will in fact be detected. Any correction of such mistakes shall be made with the tender price of the bidder being retained, and, wherever necessary, the priced schedule of quantities for the alternative design shall be adjusted accordingly. 5.4.7. <u>Acceptance of alternative design</u> The Bidder shall note that the acceptance of a tender which includes alternative designs shall mean that the alternative designs have been approved in principle only. If the final calculations, drawings and details do not comply with the specified requirements, such alternative designs may be rejected, unless they are suitably amended by the Bidder so as to be acceptable to the Employer. 5.4.8. <u>Final drawings and calculations and the priced schedule of quantities</u>

Clause number	Tender Data
	Where a tender with an alternative design has been accepted, the Contractor shall, not less than two months before he intends starting with the construction of such design, submit to the Employer's Agent a complete set of working drawings, detailed calculations and a complete schedule of quantities, for approval. The schedule of quantities shall be based on the preliminary schedule of quantities, but with the necessary adjustments in quantities and prices and with the tendered price for the alternative design being retained. Within three weeks of having received the above, the Employer's Agent will indicate which drawings, calculations, quantities, prices and other particulars are acceptable to him and which not, with reasons furnished. The Contractor shall then submit to the Employer's Agent in good time any modified drawings and other particulars for approval, for which he will require two weeks. Any delay arising from the fact that the amended particulars do not meet the requirements shall be the responsibility of the Contractor. No work which will be affected by an alternative design may be commenced, unless the drawings, schedule of quantities and prices for such alternative design have been approved. Should the Contractor fail to modify any drawings, calculations, quantities, prices or any other particulars to the satisfaction of the Employer's Agent, the alternative design will be rejected and the original design shall be constructed for the same amount as has been tendered for the alternative design. 5.4.9. <u>Responsibility for alternative design</u> The approval of a design by the Employer's Agent shall not in any way relieve the Bidder of his responsibility to produce a design which conforms in all respects to all the specified requirements and which will be suitable for the purpose envisaged. Should it appear later during construction or during the maintenance period that the design does not conform to the specified requirements, the Contractor only, shall be liable for any damage arising there from and he shall, at his own expense, do all the necessary work to ensure that the Works conforms to all the specified requirements. 5.4.10. <u>Indemnity</u> Once the alternative design has been approved, the Contractor shall indemnify and hold harmless the Employer, its agents and assigns, against all claims howsoever arising out of the said design whether in contract or delict.
5.1. <u>Submitting</u> a	5.5.1. <u>Whole of the Works</u> (Cl. F.2.13.1)

Clause number	Tender Data
<u>Tender Offer</u> Cl. F2.13	Tenderers shall offer to provide for the whole of the Works identified. 5.5.2. <u>Original tender documents</u> (Cl. F2.13.3) The original tender document, issued to the Bidder, shall be submitted in its entirety. No copies are required. 5.5.3. <u>Marking of Tender Submissions</u> (Cl. F2.13.5) The complete tender documents shall be enclosed and sealed in a single envelope, marked: “BID NO. PM47/2023 ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE. The Employer’s address for delivery of tender offers to be shown on each tender submission package is the Tender Box located at: Polokwane Municipality Civic Centre Landdros Mare Street Polokwane 5.5.4. <u>Two envelope system</u> (Cl. F2.13.6) A two-envelope procedure will not be followed. 5.5.5. <u>Closing time</u> (Cl. F2.15) The closing time for submission of tender offers is: 10H00 Telegraphic, telephonic, telex, facsimile, e-mail, electronic and late tender offers will not be accepted. 5.5.6. <u>Tender offer validity</u> (Cl. F2.16) The tender offer validity period is 90 days after tender closing date. 5.5.7. <u>Clarification of tender offer after submission</u> (Cl. F2.17) Delete the last part of the second sentence, commencing with the word “and”. Furthermore, delete the last two sentences of Cl. F2.17. Add the following sentence: “The rates stated by the Bidder shall be binding”. 5.5.8. <u>Provide other Material</u> (Cl. F2.18.1)

Clause number	Tender Data
	Upon request by the Employer, the Bidder shall promptly supply any other material that has a bearing on the tender offer, the bidder's commercial position (including, where applicable, notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the Employer for the purpose of a full and fair assessment. Should the Bidder not provide the information or material called for, by the time for submission stated in the Employer's request, the Employer will regard the tender offer as being non-responsive. 5.5.9. <u>Certificates</u> (Cl. F.2.23) The following certificates are to be provided with this tender: a) Tax Clearance Certificate b) Compensation Fund registration certificate c) Certificate of Contractor Registration issued by the Construction Industry Development Board or a copy of the application Form for registration in terms of the Construction Industry Development Board Act (Form F006). A minimum grading of 8GB is required. <u>Important Note:</u> Failure to provide the required particulars as per the above-listed certificates implies a non-responsive tender and warrants rejection of the tender on account of non-compliance with the requirements of the Tender Data
6. <u>EMPLOYER'S UNDERTAKING</u>	
6.1. <u>Opening of Tender Submissions</u> Cl. F3.4	The time and location for opening of the tender offers are: 10H:00 on 18 MARCH 2024 Location: Tender Box, Polokwane Municipality, Civic Centre, Landdros Mare Street, Polokwane
6.2. <u>Arithmetical Errors</u> Cl. F.3.9.1	Delete paragraphs (b) and (c) of Cl. F.3.9.1 and replace with: b) If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is an error in the line item resulting from the product of the unit rate and the quantity, the rate shall be binding and the error of extension as entered in the tender offer will be corrected by the Employer in determining the Contract Price. c) Where there is an error in addition, either as a result of other corrections required by this checking process or in the Bidder's addition of

Clause number	Tender Data
	prices, such error will be corrected by the Employer in determining the Contract Price. d) The Contract Price for the completed Contract shall be computed from the actual quantities of authorised work done and compliant with the Contract Data, valued at rates contracted against the respective items in the bill of quantities, schedule of Quantities or schedule of rates and shall include such authorised Provisional Sums and items of extra work as have become payable in terms of the Contract Data.
<u>7. ACCEPTANCE</u> <u>OF TENDER</u> <u>OFFER</u> Cl. F3.13	Tender offers will only be accepted if: a) The bidder has in his or her possession an original valid Tax Clearance Certificate issued by the South Africa Revenue Services; b) The bidder is registered with the Construction Industry Development Board in an appropriate contractor grading designation. A minimum grading of 8GB) is required for the main contractor; a) The bidder has demonstrated previous experience with the type of work required under this contract having successfully completed a minimum of 3 projects of similar scope and size. d) The bidder or any of its principals 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; and e) The bidder has not abused the Employer's Supply Chain Management System. f) The bidder has not failed to perform on any previous contract. g) has complete the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the bidder's ability to perform the contract in the best interests of the employer or potentially compromise the tender process.
<u>8. PROVIDE</u> <u>COPIES</u> <u>OF THE</u> <u>CONTRACT</u> <u>DOCUMENT</u>	The number of paper copies of the signed Contract to be provided by the Employer to the successful bidder is one

Clause number	Tender Data
Cl. F.3.18	

MBD 6.1

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 To be completed by the organ of state

(delete whichever is not applicable for this tender).

- a) The applicable preference point system for this tender is the **90/10** preference point system.
- b) Either the 90/10 or 80/20 preference point system will be applicable in this tender. The lowest/ highest acceptable tender will be used to determine the accurate system once tenders are received.

1.3 Points for this tender (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	90

SPECIFIC GOALS	10
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:

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

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:

$$\begin{array}{ccc} 80/20 & \text{or} & 90/10 \\ Ps = 80 \left(1 + \frac{Pt - P_{max}}{P_{max}} \right) & \text{or} & Ps = 90 \left(1 + \frac{Pt - P_{max}}{P_{max}} \right) \end{array}$$

Where

- Ps = Points scored for price of tender under consideration
- Pt = Price of tender under consideration
- Pmax = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

- 4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 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.)

The specific goals allocated points in terms of this tender	MEANS OF VERIFICATION DOCUMENTS REQUIRED	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)	Number of points claimed (80/20 system) (To be completed by the tenderer)
Black (Enterprise Owned by 51% or more black people)	Company registration copy and ID Copies of directors	3	5		
Woman (All races) (Enterprise Owned by 51% or more woman)	ID copy of the directors	3	5		
Locality (Enterprise within Jurisdiction of Polokwane Municipality)	municipal rates and taxes statement of account/ signed valid leasing agreement/	2	5		
Black South African who are Youth 18-35 years of age (Enterprise Owned by 51% or more youth)	ID copy of the directors	1	3		
People with Disability	Medical report indicating disability	1	2		

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm.....

4.4. Company registration number:

4.5. TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One-person business/sole propriety
- ☐ Close corporation
- ☐ Public Company
- ☐ Personal Liability Company
- ☐ (Pty) Limited
- ☐ Non-Profit Company

☐ 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:	.....

ANNEXURE A
SUPPLY CHAIN MANAGEMENT
EVALUATION PROCESS AND CRITERIA

The following evaluation process and criteria will be used to evaluate all bids submitted:

1. Administrative Compliance – Phase One

1.1 All bids duly lodged will be examined to determine compliance with bidding requirements and conditions. Bids with obvious deviations from the requirements/conditions, will be eliminated from further evaluation.

Critical Criteria:

The following critical criteria have been identified for this bid and any non-compliance thereto will lead to the bid being regarded as non-responsive and disqualified from further evaluation:

- Provide a valid CSD number.
- Attach company registration certificate
- All Pages of the Bid document must be initialled.
- Completed and signed declaration on past SCM practices form.
- Compulsory enterprise questionnaire completed.
- Signed J/V agreement must be attached (Where applicable).
- Proof of registration with CIDB attached.
- Proof of Municipal Rates and Taxes statement of account for the company and all the directors which are not older than three (3) months or Signed Valid lease agreement for service providers who are renting or leasing offices or Letter from tribal authority not older than 3 Months.
- Complete **MBD5** and submit Audited or Reviewed Financial Statements (**AFS**) for the last three (3) years. – (Only where the tender amount **exceeds R10mil** - including VAT).
- Complete and signing of the declaration of interest form (**MBD4**).
- All corrections made in the document, including bills of quantities, must be initialled.
- Bid document must be printed in colour coding as per page 5.

2. Functionality – Phase Two (50 points allocation)

The bidders who complied administratively are considered for further evaluation on ability to execute the project.

The assessment of functionality will be done in terms of the evaluation criteria and minimum threshold as specified. A bid will be disqualified if it fails to meet the minimum threshold for functionality as per the bid invitation.

1.1. Relevant Experience of Company (25 points)

This will take into consideration similar contracts successfully completed by the bidder.

NB. Proof of projects of similar size and scope must be attached (Appointment letter and Certificate of Completion for EACH project). Failure to provide proof will result in disqualification of points.

The score will be calculated as follows:

- Appointment Letters and Certificates of Completion of similar size and scope experience of the Company.

RELEVANT EXPERIENCE	
Projects with similar scope and size	Points Allocated
1 Project	5
2 Projects	10
3 Projects	15

4 Projects	20
5 Projects	25

2.2 Plant and Equipment (15 points)

This will be assessed against a minimum number of different types of plant and equipment required to successfully complete the project within the stipulated construction period as determined by the engineer.

Access to plant may be in a form of ownership, hire or leasing arrangements, orders etc. A letter of intent from hiring or leasing companies stating the number and type of plant and equipment on which arrangement has been made must be submitted. Any changes to the lease/hire agreement must be approved by the Municipality prior commencement.

NB. 50% of points will be allocated to equipment leased/hired.

Consultants Estimation				
(A) Plant and equipment required	points allocation	(B) Minimum Plant required	(C) Bidder Plant own	(D) Bidder Plant hire
Grader (140G or equivalent)	2	1		
Tipper Truck (6 – 10m ³)	6	3		
Roller/Compactor (Smooth)	2	1		
Water Tanker	2	1		
Excavator (20 ton minimum)	2	1		
TLB (4X4)	1	1		

NB. Proof of ownership on equipment indicated above must be submitted with the bid document. Failing to submit will result in disqualification of points.

2.3 Financial Status (10 points)

This will be assessed against Bank ratings as follows: (If a Bank letter is submitted, it should be specific for this project and not older than 30 days)

Bank Rating	Score
A	10
B	10
C	7
D	5
E	2
F,G,H	0

NB: A bid will be disqualified if it fails to meet the minimum threshold of 60% on functionality and a minimum of 15 points on relevant experience.

PHASE 3: PRICE AND SPECIFIC GOALS

THE EVALUATION WILL BE DONE USING 90/10-POINT SYSTEM, 90 FOR PRICE AND 10 FOR SPECIFIC GOALS

Notes: Bidders must note that points for specific goals must be claimed in terms with the percentage of ownership within their business entity. The tenderer must indicate how they claim points.)

The specific goals allocated points in terms of this tender	MEANS OF VERIFICATION DOCUMENTS REQUIRED	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)	Number of points claimed (80/20 system) (To be completed by the tenderer)
Black (Enterprise Owned by 51% or more black people)	Company registration copy and ID Copies of directors	3	5		
Woman (All races) (Enterprise Owned by 51% or more woman)	ID copy of the directors	3	5		
Locality (Enterprise within Jurisdiction of Polokwane Municipality)	municipal rates and taxes statement of account/ signed valid leasing agreement/	2	5		
Black South African who are Youth 18-35 years of age (Enterprise Owned by 51% or more youth)	ID copy of the directors	1	3		
People with Disability	Medical report indicating disability	1	2		

The specific goals are claimed as per below table for business ownership disclosure. Bidders must list all shareholders and provide ownership information in terms of the business entity registration certificate

Full Names	Identity Number	% of ownership	South African (Yes/No)	Race	Gender	Disable (Yes/No)	Youth (Yes/No)	Local enterprise (Yes/No)

2.4 Commercial Risk Analysis

Prior to being recommended for further evaluation, a bid will be subjected to risk analysis to ensure that it would, if accepted, not place the Municipality or the bidder, at undue risk.

A risk analysis will be performed to ascertain if any of the following might present an unacceptable commercial risk to the Municipality:

- Unduly low tendered sums
- Unduly high individual rates
- Unduly low rates
- Imbalances in pricing

It is in the best interests of the Municipality to amend an error which will cause the bid to be rejected on the basis of it presenting an unacceptable commercial risk.

2.5 Tendered rates

Rates for all the bids which have complied with the bid conditions will be assessed for the following:

- Comparison of rates and amounts with the average tendered amount.
- Sensitivity Analysis of Rates (i.e. whether the rates are balanced, acceptable, etc).
- Expected cash flows requirements.

NB: Bids with unbalanced rates will be disqualified for further evaluation on price and preference points system

3 Business Registration

Prospective bidders shall be registered:

- (a) With the South African Revenue Services for all categories of taxes applicable to it.
- (b) With the Compensation Commissioner
- (c) With the Construction Industry Development Board.
- (d) A minimum grading of **8GB** is required.

4 Acceptance of Tender Offer (Cl. F3.13)

Tender offers will only be accepted if:

- a) The bidder has in his or her possession an original valid Tax Clearance Certificate issued by the South Africa Revenue Services;
- b) The bidder is registered with the Construction Industry Development Board in an appropriate contractor grading designation.
A minimum grading of **8GB** is required;
- c) the bidder or any of its principals 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; and
- d) The bidder has not abused the Employer's Supply Chain Management System.
- e) The bidder has not failed to perform on any previous contract.
- f) has complete the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the bidder's ability to perform the contract in the best interests of the employer or potentially compromise the tender process.

5. Provide copies of the Contract Document (Cl. F3.18)

The number of paper copies of the signed Contract to be provided by the Employer to the successful bidder is **one**

Annexure A: Standard Conditions of Tender

F.1 General

F.1.1 Actions

The employer and each Tenderer submitting a Tender offer shall comply with these conditions of Tender. In their dealings with each other, they shall discharge their duties and obligations as set out in F.2 and F.3, timeously and with integrity, and behave equitably, honestly and transparently.

F.1.2 Tender Documents

The documents issued by the employer for the purpose of a Tender offer are listed in the Tender data.

F.1.3 Interpretation

F.1.3.1 The Tender data and additional requirements contained in the Tender schedules that are included in the returnable documents are deemed to be part of these conditions of Tender.

F.1.3.2 These conditions of Tender, the Tender data and Tender schedules which are only required for Tender evaluation purposes, shall not form part of any contract arising from the invitation to Tender.

F.1.3.3 For the purposes of these conditions for the calling for expressions of interest, the following definitions apply:

- a) **Comparative offer** means the Tenderer's financial offer after the factors of non-firm prices, all unconditional discounts and any other Tendered parameters that will affect the value of the financial offer have been taken into consideration
- b) **corrupt practice** means the offering, giving, receiving or soliciting of anything of value to influence the action of the employer or his staff or agents in the Tender process; and
- c) **Fraudulent practice** means the misrepresentation of the facts in order to influence the Tender process or the award of a contract arising from a Tender offer to the detriment of the employer, including collusive practices intended to establish prices at artificial levels
- d) **Quality (functionality)** means the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs

F.1.4 Communication and employer's agent

Each communication between the employer and a Tenderer shall be to or from the employer's agent only, and in a form that can be read, copied and recorded. Writing shall be in the English language. The employer shall not take any responsibility for non-receipt of communications from or by a Tenderer. The name and contact details of the employer's agent are stated in the Tender data.

F.1.5 The employer's right to accept or reject any Tender offer

F.1.5.1 The employer may accept or reject any variation, deviation, Tender offer, or alternative Tender offer, and may cancel the Tender process and reject all Tender offers at any time before the formation of a contract. The employer shall not accept or incur any liability to a

Tenderer for such cancellation and rejection, but will give written reasons for such action upon written request to do so.

F.1.5.2 The employer may not subsequent to the cancellation or abandonment of a Tender process or the rejection of all responsive Tender offers re-issue a Tender covering substantially the same scope of work within a period of six months unless only one Tender was received and such Tender was returned unopened to the Tenderer.

F.2 Tenderer's obligations

F.2.1 Eligibility

Submit a Tender offer only if the Tenderer satisfies the criteria stated in the Tender data and the Tenderer, or any of his principals, is not under any restriction to do business with employer.

F.2.2 Cost of Tendering

Accept that the employer will not compensate the Tenderer for any costs incurred in the preparation and submission of a Tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

F.2.3 Check documents

Check the Tender documents on receipt for completeness and notify the employer of any discrepancy or omission.

F.2.4 Confidentiality and copyright of documents

Treat as confidential all matters arising in connection with the Tender. Use and copy the documents issued by the employer only for the purpose of preparing and submitting a Tender offer in response to the invitation.

F.2.5 Reference documents

Obtain, as necessary for submitting a Tender offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the Tender documents by reference.

F.2.6 Acknowledge addenda

Acknowledge receipt of addenda to the Tender documents, which the employer may issue, and if necessary apply for an extension to the closing time stated in the Tender data, in order to take the addenda into account.

F.2.7 Clarification meeting

Attend, where required, a clarification meeting at which Tenderers may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the Tender data.

F.2.8 Seek clarification

Request clarification of the Tender documents, if necessary, by notifying the employer at least five working days before the closing time stated in the Tender data.

F.2.9 Insurance

Be aware that the extent of insurance to be provided by the employer (if any) might not be for the full cover required in terms of the conditions of contract identified in the contract data. The Tenderer is advised to seek qualified advice regarding insurance.

F.2.10 Pricing the Tender offer

F.2.10.1 Include in the rates, prices, and the Tendered total of the prices (if any) all duties, taxes (except Value Added Tax (VAT)), and other levies payable by the successful Tenderer, such duties, taxes and levies being those applicable 14 days before the closing time stated in the Tender data.

F2.10.2 Show VAT payable by the employer separately as an addition to the Tendered total of the prices.

F.2.10.3 Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

F.2.10.4 State the rates and prices in Rand unless instructed otherwise in the Tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

F.2.11 Alterations to documents

Not make any alterations or additions to the Tender documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the Tenderer. All signatories to the Tender offer shall initial all such alterations. Erasures and the use of masking fluid are prohibited.

F.2.12 Alternative Tender offers

F.2.12.1 Submit alternative tender offer only if a main tender offer, strictly in accordance with all the requirements of the tender document, is also submitted. The alternative tender offer is to be submitted with the main tender offer together with a schedule that compares the requirements of the tender document with the alternative requirements the tenderer proposes.

F.2.12.2 Accept that an alternative tender offer may be based only on the criteria stated in the tender data or criteria otherwise acceptable to the employer.

F.2.13 Submitting a Tender offer

F.2.13.1 Submit a Tender offer to provide the whole of the works, services or supply identified in the contract data and described in the scope of works, unless stated otherwise in the Tender data.

F.2.13.2 Return all returnable documents to the employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing in black ink.

F.2.13.3 Submit the parts of the Tender offer communicated on paper as an original plus the number of copies stated in the Tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.

F.2.13.4 Sign the original and all copies of the Tender offer where required in terms of the Tender data. The employer will hold all authorized signatories liable on behalf of the Tenderer. Signatories for Tenderers proposing to contract as joint ventures shall state which of the signatories is the lead partner whom the employer shall hold liable for the purpose of the Tender offer.

F.2.13.5 Seal the original and each copy of the Tender offer as separate packages marking the packages as "ORIGINAL" and "COPY". Each package shall state on the outside the employer's address and identification details stated in the Tender data, as well as the Tenderer's name and contact address.

F.2.13.6 Where a two-envelope system is required in terms of the Tender data, place and seal the returnable documents listed in the Tender data in an envelope marked "financial proposal" and place the remaining returnable documents in an envelope marked "technical proposal". Each envelope shall state on the outside the employer's address and identification details stated in the Tender data, as well as the Tenderer's name and contact address.

F.2.13.7 Seal the original Tender offer and copy packages together in an outer package that states on the outside only the employer's address and identification details as stated in the Tender data.

F.2.13.8 Accept that the employer will not assume any responsibility for the misplacement or premature opening of the Tender offer if the outer package is not sealed and marked as stated.

F.2.14 Information and data to be completed in all respects

Accept that Tender offers, which do not provide all the data or information requested completely and in the form required, may be regarded by the employer as non-responsive.

F.2.15 Closing time

F.2.15.1 Ensure that the employer receives the Tender offer at the address specified in the Tender data not later than the closing time stated in the Tender data. Proof of posting shall not be accepted as proof of delivery. The employer shall not accept Tender offers submitted by telegraph, telex, facsimile or e-mail, unless stated otherwise in the Tender data.

F.2.15.2 Accept that, if the employer extends the closing time stated in the Tender data for any reason, the requirements of these conditions of Tender apply equally to the extended deadline.

F.2.16 Tender offer validity

F.2.16.1 Hold the Tender offer(s) valid for acceptance by the employer at any time during the validity period stated in the Tender data after the closing time stated in the Tender data.

F.2.16.2 If requested by the employer, consider extending the validity period stated in the Tender data for an agreed additional period.

F.2.17 Clarification of Tender offer after submission

Provide clarification of a Tender offer in response to a request to do so from the employer during the evaluation of Tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the total of the prices or substance of the Tender offer is sought, offered, or permitted. The total of the prices stated by the Tenderer shall be binding upon the Tenderer.

Note: Sub-clause F.2.17 does not preclude the negotiation of the final terms of the contract with a preferred Tenderer following a competitive selection process, should the Employer elect to do so.

F.2.18 Provide other material

F.2.18.1 Provide, on request by the employer, any other material that has a bearing on the Tender offer, the Tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the Tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the Tender offer as non-responsive.

F.2.18.2 Dispose of samples of materials provided for evaluation by the employer, where required.

F.2.19 Inspections, tests and analysis

Provide access during working hours to premises for inspections, tests and analysis as provided for in the Tender data.

F.2.20 Submit securities, bonds, policies, etc.

If requested, submit for the employer's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

F.2.21 Check final draft

Check the final draft of the contract provided by the employer within the time available for the employer to issue the contract.

F.2.22 Return of other Tender documents

If so instructed by the employer, return all retained Tender documents within 28 days after the expiry of the validity period stated in the Tender data.

F.2.23 Certificates

Include in the Tender submission or provide the employer with any certificates as stated in the Tender data.

F.3 The employer's undertakings

F.3.1 Respond to clarification

Respond to a request for clarification received up to five working days before the Tender closing time stated in the Tender Data and notify all Tenderers who drew procurement documents.

F.3.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the Tender documents to each Tenderer during the period from the date that Tender documents are available until seven days before the Tender closing time stated in the Tender Data. If, as a result a Tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all Tenderers who drew documents.

F.3.3 Return late Tender offers

Return Tender offers received after the closing time stated in the Tender Data, unopened, (unless it is necessary to open a Tender submission to obtain a forwarding address), to the Tenderer concerned.

F.3.4 Opening of Tender submissions

F.3.4.1 Unless the two-envelope system is to be followed, open valid Tender submissions in the presence of Tenderers' agents who choose to attend at the time and place stated in the Tender data. Tender submissions for which acceptable reasons for withdrawal have been submitted will not be opened.

F.3.4.2 Announce at the meeting held immediately after the opening of Tender submissions, at a venue indicated in the Tender data, the name of each Tenderer whose Tender offer is opened, the total of his prices, preferences claimed and time for completion, if any, for the main Tender offer only.

F.3.4.3 Make available the record outlined in F.3.4.2 to all interested persons upon request.

F.3.5 Two-envelope system

F.3.5.1 Where stated in the Tender data that a two-envelope system is to be followed, open only the technical proposal of valid Tenders in the presence of Tenderers' agents who choose to attend at the time and place stated in the Tender data and announce the name of each Tenderer whose technical proposal is opened.

F.3.5.2 Evaluate the quality of the technical proposals offered by Tenderers, then advise Tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of Tenderers, who score in the quality evaluation more than the minimum number of points for quality stated in the Tender data, and announce the score obtained for the technical proposals and the total price and any preferences claimed. Return unopened financial proposals to Tenderers whose technical proposals failed to achieve the minimum number of points for quality.

F.3.6 Non-disclosure

Not disclose to Tenderers, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of Tender offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful Tenderer.

F.3.7 Grounds for rejection and disqualification

Determine whether there has been any effort by a Tenderer to influence the processing of Tender offers and instantly disqualify a Tenderer (and his Tender offer) if it is established that he engaged in corrupt or fraudulent practices.

F.3.8 Test for responsiveness

F.3.8.1 Determine, on opening and before detailed evaluation, whether each Tender offer properly received:

- a) complies with the requirements of these Conditions of Tender,
- b) has been properly and fully completed and signed, and
- c) is responsive to the other requirements of the Tender documents.

F.3.8.2 A responsive Tender is one that conforms to all the terms, conditions, and specifications of the Tender documents without material deviation or qualification. A material deviation or qualification is one which, in the Employer's opinion, would:

- a) Detrimentially affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,
- b) Change the Employer's or the Tenderer's risks and responsibilities under the contract, or,
- c) Affect the competitive position of other Tenderers presenting responsive Tenders, if it were to be rectified. Reject a non-responsive Tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

F.3.9 Arithmetical errors

F.3.9.1 Check responsive Tender offers for arithmetical errors, correcting them in the following manner:

- a) Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.
- b) If bills of quantities (or schedule of quantities or schedule of rates) apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall be corrected.
- c) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the Tenderer's addition of prices, the total of the prices shall govern and the Tenderer will be asked to revise selected item prices (and their rates if bills of quantities apply) to achieve the Tendered total of the prices.

F.3.9.2 Consider the rejection of a Tender offer if the Tenderer does not correct or accept the correction of his arithmetical errors in the manner described in F.3.9.1.

F.3.10 Clarification of a Tender offer

Obtain clarification from a Tenderer on any matter that could give rise to ambiguity in a contract arising from the Tender offer.

F.3.11 Evaluation of Tender offers

F.3.11.1 General

Appoint an evaluation panel of not less than three persons. Reduce each responsive Tender offer to a comparative offer and evaluate it using the Tender evaluation method that is indicated in the Tender Data and described below:

Method 1: Financial offer	1) Rank Tender offers from the most favourable to the least favourable comparative offer.
	2) Recommend highest ranked Tenderer for the award of the contract, unless there are compelling and justifiable reasons not to do so.
Method 2: Financial offer and preferences	1) Score Tender evaluation points for financial offer.
	2) Confirm that Tenderers are eligible for the preferences claimed and if so, score Tender evaluation points for preferencing.
	3) Calculate total Tender evaluation points.
	4) Rank Tender offers from the highest number of Tender evaluation points to the lowest.
	5) Recommend 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.
Method 3: Financial offer and quality	1) Score quality, rejecting all Tender offers that fail to score the minimum number of points for quality stated in the Tender data.
	2) Score Tender evaluation points for financial offer.
	3) Calculate total Tender evaluation points.
	4) Rank Tender offers from the highest number of Tender evaluation points to the lowest.
	5) Recommend 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.
Method 4: Financial offer, quality and preferences	1) Score quality, rejecting all Tender offers that fail to score the minimum number of points for quality stated in the Tender data.
	2) Score Tender evaluation points for financial offer.
	3) Confirm that Tenderers are eligible for the preferences claimed, and if so, score Tender evaluation points for preferencing.
	4) Calculate total Tender evaluation points.
	5) Rank Tender offers from the highest number of Tender evaluation points to the lowest.
	6) Recommend 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.

Score financial offers, preferences and quality, as relevant, to two decimal places.

F.3.11.2 Scoring Financial Offers

Score the financial offers of remaining responsive Tender offers using the following formula:

NFO = $W1 \times A$ where:
 NFO = the number of Tender evaluation points awarded for the financial offer.
 W1 = the maximum possible number of Tender evaluation points awarded for the financial offer as stated in the Tender Data.
 A = a number calculated using either formulas 1 or 2 below as stated in the Tender Data.

Formula	Comparison aimed at achieving	Option 1	Option 2
1	Highest price or discount	$A = (1 + \frac{P - P_m}{P_m})$	$A = P / P_m$
2	Lowest price or percentage commission / fee	$A = (1 - \frac{P - P_m}{P_m})$	$A = P_m / P$

where:

P_m = the comparative offer of the most favourable Tender offer.
 P = the comparative offer of Tender offer under consideration.

F.3.11.3 Scoring quality (functionality)

Score quality in each of the categories in accordance with the Tender Data and calculate total score for quality.

F.3.12 Insurance provided by the employer

If requested by the proposed successful Tenderer, submit for the Tenderer's information the policies and / or certificates of insurance which the conditions of contract identified in the contract data, require the employer to provide.

F.3.13 Acceptance of Tender offer

F.3.13.1 Accept Tender offer only if the Tenderer complies with the legal requirements stated in the Tender Data.

F.3.13.2 Notify the successful Tenderer of the employer's acceptance of his Tender offer by completing and returning one copy of the form of offer and acceptance before the expiry of the validity period stated in the Tender data, or agreed additional period. Providing the form of offer and acceptance does not contain any qualifying statements, it will constitute the formation of a contract between the employer and the successful Tenderer as described in the form of offer and acceptance.

F.3.14 Notice to unsuccessful Tenderers

After the successful Tenderer has acknowledged the employer's notice of acceptance, notify other Tenderers that their Tender offers have not been accepted.

F.3.15. Prepare contract documents

If necessary, revise documents that shall form part of the contract and that were issued by the employer as part of the Tender documents to take account of:

- a) addenda issued during the Tender period,
- b) inclusion of some of the returnable documents,
- c) other revisions agreed between the employer and the successful Tenderer, and
- d) the schedule of deviations attached to the form of offer and acceptance, if any.

F.3.16 Issue final contract

Prepare and issue the final draft of contract documents to the successful Tenderer for acceptance as soon as possible after the date of the employer's signing of the form of offer and acceptance (including the schedule of deviations, if any). Only those documents that the conditions of Tender require the Tenderer to submit, after acceptance by the employer, shall be included.

F.3.17 Complete adjudicator's contract

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

F.3.18 Provide copies of the contracts

Provide to the successful Tenderer the number of copies stated in the Tender Data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

A: SCHEDULE OF LABOUR CONTENT

The Tenderer must complete the table below to reflect the labour force anticipated to be employed on this contract, including labour employed by sub-contractors.

The specified target value is **5%** of the contract value

Type of Labour	Man-hours	Minimum Wage Rate per Unit	Total Wage Cost (Excl VAT)
Permanent Labour			
Temporary Labour			
SMME/HDI's Labour			
TOTAL PERCENTAGE			

Notes to Tenderer:

- (1) Labour is defined as hourly paid personnel.
- (2) The penalty will be applied for non-compliance during the contract or for fraudulent disclosure
- 3) **Daily Rate = R191.60**

SIGNED ON BEHALF OF THE TENDERER:

B.1 EMPLOYMENT OF AFFIRMATIVE BUSINESS ENTERPRISE DECLARATION AFFIDAVIT (ABE).

It is understood and agreed that should this contract be awarded to me, an ABE Declaration Affidavit will be completed by each and every ABE employed by me on this contract and will be submitted to the Employer immediately upon demand by the Employer.

SIGNED ON BEHALF OF THE TENDERER

1. TRAINING

Name of Training Institution:.....

Name of Programme:.....

Trainer’s Name	Qualification	Subject

Notes to tenderer:
Provide details here, or attach hereto, the subjects to be covered and the manner in which the training is to be delivered.

SIGNED ON BEHALF OF THE TENDERER

2. ENGINEERING STUDENT TRAINING

Name of Training Institution:.....

Name of Programme:.....

Trainer's Name	Qualification	Subject

Notes to tenderer:

- 1. Provide details here, or attach hereto, the subjects to be covered and the manner in which the training is to be delivered.**
- 2. Provision should also include on-job student / (in-service) training for a period of not less than 06 months at a monthly stipend of R 4 500.00**

SIGNED ON BEHALF OF THE TENDERER

POLOKWANE MUNICIPALITY

T2.1 List of Returnable Documents

The Tenderer must complete the following returnable documents:

- 1. Returnable Schedules required only for Tender evaluation purposes**
 - A. Certificate of Attendance at Site Clarification Meeting
 - B. Certificate of Authority of Signatory
 - C. Certificate of Registration with the Construction Industry Development Board
 - D. Certificate of authority for joint ventures (where applicable)
 - E. Compulsory Enterprise Questionnaire
 - F. Record of Addenda to Tender Documents
 - G. Proposed Amendments and Qualifications
 - H. Form of Intent to Provide a Demand Guarantee
 - I. Schedule of Subcontractors
 - J. Schedule of Available Infrastructure, Resources and Experience
 - K. Financial Information of the Tenderer
 - L. Certificate for Municipal Services and Payments: Annexure B
 - M. Authorisation for deduction of outstanding amounts owed to Council: Annexure C
 - N. Declaration of Tenderer's Past Supply Chain Management Practices: MBD 8
 - O. Declaration of interest : SBD 4
 - P. National industrial participation programme :SBD 5
 - Q. Declaration for procurement above R10 Million :MBD 5
 - R. Declaration certificate for local production and content: MBD 6.2
 - S. Certificate of the Independent Tender Determination: MBD 9
 - T. Compliance with OHSA (Act 85 of 1993)
 - U. Original Bank rating letter
 - V. Day Works
- 2. Other documents required only for Tender evaluation purposes**
 - Compensation Fund Registration Certificate
 - Curricula Vitae of Personnel
 - Rates of Labour and Materials (Day work Rates)
 - Copy of company registration certificate (C.K. Certificate) with shareholding
 - Schedule of Labour Content
 - Employment of ABE'S
 - ABE Declaration Affidavit
 - Generic Training
 - Complete MBD 5 where the Tender amount inclusive of VAT exceeds R 10 million:
- 3. Other documents that will be incorporated into the contract**
 - 3.1 The offer portion of the C1.1 Offer and Acceptance
 - 3.2 C1.2 Contract Data (Part 2)
 - 3.3 C2.2 Bills of Quantities

A. CERTIFICATE OF ATTENDANCE AT SITE CLARIFICATION MEETING

This is to certify that:

.....
(Tenderer)

of
(Address)

.....
.....

was represented by the person(s) named below at the compulsory meeting held for all Tenderers at

.....(location) on (date), starting at
.....

We acknowledge that the purpose of the meeting was to acquaint ourselves with the Site of the Works and/or matters incidental to doing the work specified in the Tender documents in order for us to take account of everything necessary when compiling our entire Tender submission.

Particulars of person(s) attending the meeting:

Name Signature.....

Capacity.....

Name Signature.....

Capacity.....

Note: All particulars above this horizontal divide line to be filled in by the Tenderer **prior to** signature by Employer's representative.

Attendance of the above persons at the meeting is confirmed by the representative of.....
Consulting Services namely:

Name Signature

Capacity..... Date Time
.....

CERTIFICATE OF AUTHORITY OF SIGNATORY

Indicate the status of the Tenderer by ticking the appropriate box hereunder. The Tenderer must complete the certificate set out below for the relevant category.

1	Company	
---	---------	--

2	Partnership	
---	-------------	--

3	Joint Venture	
---	---------------	--

4	Sole Proprietor	
---	-----------------	--

5	Close Corporation	
---	-------------------	--

1. Certificate for company

I,, chairperson of the board of directors of

....., hereby confirm that by resolution of the board

(copy attached) taken on 20....., Mr/Ms,

acting in the capacity of, was authorised to sign all documents in connection with this Tender and any contract resulting from it on behalf of the company.

As witnesses:

1.
.....

.....
Chairman

.....
.....

Print Name Print Name

2.
.....

Date

.....
Print Name

2. Certificate of partnership

We, the undersigned, being the key partners in the business trading as, hereby authorise Mr/Ms, acting in the capacity of, to sign all documents in connection with the Tender for Contract, and any contract resulting from it on our behalf.

Name	Address	Signature	Date

NOTE: This certificate is to be completed and **signed by each and all of the key partners** upon whom rests the direction of the affairs of the Partnership as a whole.

3. Certificate for Joint Venture

We, the undersigned, are submitting this Tender offer in Joint Venture and hereby authorize Mr/Ms, authorised signatory of the firm, acting in the capacity of lead partner, to sign all documents in connection with the Tender offer for Contract and any contract resulting from it on our behalf.

This authorisation is evidenced by the attached power of attorney signed by legally authorised signatories of all the partners to the Joint Venture.

Name of Firm	Address	Authorising	
		Signature	Name
Lead Partner			

4. Certificate for sole proprietor

I,, hereby confirm that I am the sole owner of the business trading

as

As witnesses:-

1.
Signature: Sole Owner

.....
Print Name

.....
Print Name

2.

.....
Print Name

.....
Date

5. Certificate for Close Corporation

We, the undersigned, being the key members in the business trading as hereby authorise Mr/Ms acting in the capacity of, to sign all documents in connection with the Tender for Contract and any contract resulting from it on our behalf.

Name	Address	Signature	Date

Note: This Certificate is to be completed and signed by each and all of the key members upon whom rests the direction of the affairs of the Close Corporation as a whole.

CERTIFICATE OF REGISTRATION WITH THE CONSTRUCTION INDUSTRY DEVELOPMENT BOARD

1. General

The Register of Contractors is established by the Construction Industry Development Board in terms of the CIDB Act 38 of 2000 and Construction Industry Development Regulations as published in Government Gazette number 26427 of 2004.

The Act makes it mandatory for public sector clients to apply this register when considering Tenders. Any enterprise that submits a Tender or enters into contract for construction works with the public sector, must be registered.

Once-off joint ventures do not have to register, provided that each partner of the joint venture is separately registered.

2. Status

Tenderers shall fill in the following sections of this form, depending on their status:

2.1 Section A

Tenderers who have accomplished registration and can provide proof of their grading designation.

2.2 Section B

Tenderers who are in the process of registration of an update to an existing registration or a renewal.

2.3 Section C

Tenderers who have submitted the first application.

2.4 Section D

Tenderers submitting this Tender offer in Joint Venture and can provide proof that each partner of the Joint Venture is separately registered.

SECTION B

I, acting in capacity of
was authorised to sign all documents in connection with this tender an any contract resulting from
it on

behalf of the following entity:
hereby declare that the above mentioned entity has achieved registration with the Construction In-
dustry Development Board on date, furthermore declare that the
existing grading designation is:

Contract Value	
----------------	--

Type of Work		
--------------	--	--

and the following update has been applied for:

Amendment of category status	
Change of Particulars	
Annual confirmation of Particulars	
Renewal of Registration	

mark with "❖"

.....
Signature of Tenderer

.....
Signature of Witness

.....
Print Name

.....
Print Name

SECTION C	
I, acting in capacity of was authorised to sign all documents in connection with this tender an any contract resulting from it on behalf of the following entity: hereby declare that the above mentioned entity has submitted its FIRST APPLICATION FOR REGISTRATION with the Contraction Industry Development board on date I furthermore accept that failure to achieve registration with the Construction Industry Development Board in a category stipulated in the Tender Data within 10 days from the date of closing this tender, implies a non-responsive tender and warrants rejection of the Tender on account of non-compliance with the requirements of the Tender Data.	
..... Signature of Tenderer	 Signature of Witness
..... Print Name	 Print Name

SECTION D										
I, acting in capacity of the LEAD PARTNER in the Joint Venture was authorised to sign all documents in connection with this tender and any contract resulting from it, hereby declare that each partner of the Joint Venture is separately registered with the Construction Industry Development Board and declare that the grading designation is reflected in the following symbols on the registration certificates:										
<table border="1" style="border-collapse: collapse;"><tr><td colspan="3">Name of Lead Partner:</td></tr><tr><td style="width: 150px;">Contract Value</td><td style="width: 50px;"></td><td style="width: 50px;"></td></tr><tr><td>Type of Work</td><td></td><td></td></tr></table>		Name of Lead Partner:			Contract Value			Type of Work		
Name of Lead Partner:										
Contract Value										
Type of Work										
<table border="1" style="border-collapse: collapse;"><tr><td colspan="3">Name of 2nd Partner:</td></tr><tr><td style="width: 150px;">Contract Value</td><td style="width: 50px;"></td><td style="width: 50px;"></td></tr><tr><td>Type of Work</td><td></td><td></td></tr></table>		Name of 2 nd Partner:			Contract Value			Type of Work		
Name of 2 nd Partner:										
Contract Value										
Type of Work										
<table border="1" style="border-collapse: collapse;"><tr><td colspan="3">Name of 3rd Partner:</td></tr><tr><td style="width: 150px;">Contract Value</td><td style="width: 50px;"></td><td style="width: 50px;"></td></tr><tr><td>Type of Work</td><td></td><td></td></tr></table>		Name of 3 rd Partner:			Contract Value			Type of Work		
Name of 3 rd Partner:										
Contract Value										
Type of Work										
..... Signature of Tenderer	 Signature of Witness									
..... Print Name	 Print Name									

B. CERTIFICATE OF AUTHORITY FOR JOINT VENTURES (WHERE APPLICABLE)

Employer:

.....

Contract

Number:

.....

NOTE 1 This form need only be completed in the event of a Joint Venture submitting this Tender.

NOTE 2 Fill in all the information requested in the spaces provided. Attach additional sheets if required.

NOTE 3 Provide a copy of the Joint Venture agreement. Demonstrate that the partners to the Joint Venture share in the ownership, control, management responsibilities, risks and profits of the Joint Venture. The Joint Venture agreement shall include specific details relating to:

- a) the contributions of capital and equipment;
- b) portions of the Contract to be performed by the partner's own resources; and
- c) portions of the Contract to be performed under the supervision of each partner.

NOTE 4 Provide copies of all written agreements between partners concerning the Joint Venture, including those that relate to ownership options and to restrictions/limits regarding ownership and control.

1. Joint Venture Particulars

Name

.....

Postal

Address

.....

Physical Address

.....

.....

Telephone

.....

Fax

.....

.....

Name of authorized representative
.....

2. Identity of Partner No. 1

Name
.....
.....

Postal Address
.....

Physical Address
.....

Telephone
.....

Fax

Contact Person.....

3. Identity of Partner No. 2

Name
.....

Postal Address
.....

Physical Address
.....

Telephone
.....

Fax
.....

Contact Person
.....

4. Identity of Partner No. 3

Name

Postal

Address

Physical Address

Telephone

Fax

Contact

Person

5. Description of the role of the partners in the joint venture

Partner

No.

1:

Partner

No.

2:

Partner

No.

3:

6. Ownership of the joint venture

(i)

Ownership percentage(s)
%

Partner No. 1

Partner No. 2

Partner No. 3

(ii)

Partner percentage in respect of:

a) Profit and loss sharing:

Partner No. 1

Partner No. 2

Partner No. 3
%

b) Initial capital contribution Partner No. 1 R.....
Partner No. 2 R.....

Partner No. 3 R.....

(iii) Anticipated ongoing capital contributions:

Partner No. 1 R.....

Partner No. 2 R.....

Partner No. 3 R.....

(iv) Contributions of equipment (specify types, quality and quantities of equipment) to be provided by each partner:

Partner No. 1:
.....
.....

Partner No. 2:
.....
.....

Partner No. 3:
.....
.....

7. Recent contracts performed by partners in their own right or as partners in other joint ventures

a) Partner No. 1

(i)

(ii)

(iii)

(iv)

(v)
.....

b) Partner No. 2

(i)
.....

(ii)
.....

(iii)
.....

(iv)
.....

(v)
.....

c) Partner No. 3

(i)
.....

(ii)
.....

(iii)
.....

(iv)
.....

(v)
.....

8. Control and participation in the joint venture

(Identify by name and firm those individuals who are, or will be, responsible for, and have authority to engage in the relevant management functions and policy and decision making, indicating any limitations in their authority, for example, co-signature requirements and monetary limits).

a) Joint Venture cheque signing
.....
.....

.....
b) Authority to enter into contracts on behalf of the Joint Venture

.....
.....
.....
c) Signing, co-signing or collateralizing of loans

.....
.....
.....
d) Acquisition of lines of credit

.....
.....
.....
e) Acquisition of demand bonds

.....
.....
.....
f) Negotiating and signing of labour agreements

9. Management of the performance of the Contract
(Fill in the name and firm of the responsible person)

a) Supervision of field
operations.....
.....

- b) Major purchasing.....
.....
- c) Estimating.....
.....
- d) Technical management.....
.....

10. Management and control of the joint venture

- a) Identify the managing partner
.....
.....
- b) What authority does each partner have to commit or obligate the other to financial institutions, insurance companies, suppliers, subcontractors or other parties participating in the performance of the contemplated works:

Partner	No.	1:
.....		
.....		
Partner	No.	2:
.....		
Partner	No.	3:
.....		
.....		
- c) Describe the management structure for the joint venture's work under this Contract

Management Function/Designation	Name	Partner

11. Personnel

- a) State the approximate number of operative personnel (by trade/function/discipline) needed to execute the Joint Venture contract.

Trade/function/discipline	Number

- b) State the number of operative personnel to be employed on the Contract who are currently in the employ of partners:

.....

- c) State the number of operative personnel who are not currently in the employ of the respective partners and shall be engaged on the project by the Joint Venture:

.....

- d) State the name of the individual who shall be responsible for hiring Joint Venture employees:

.....

- e) State the name of the partner who shall be responsible for the preparation of Joint Venture payrolls:

.....

12. Services

List the firms who provide the following services:

Service	Name	Contact Person	Telephone No.
Accounting			
Auditing			
Banking			
Insurance			
Legal			

13. Control and structure of the Joint Venture

Briefly describe the manner in which the Joint Venture is structured and controlled.

.....

.....

.....

The undersigned warrants that he/she is duly authorised to sign this Joint Venture disclosure form and affirms that the foregoing statements are correct and include all the material information necessary to identify and explain the terms and operations of the Joint Venture and the intended participation of each partner in the undertaking.

The undersigned further covenants and agrees to provide the Employer with complete and accurate information regarding actual joint venture work and the payment therefore, and any proposed changes in any provisions of the Joint Venture Agreement, and to permit the audit and examination of the books, records and files of the Joint Venture, or those of each partner relevant to the Joint Venture, by duly authorized representatives of the Employer.

Duly authorized to sign on behalf of:

.....

..... (the Joint Venture)

Signature: Print Name:

Name:

Address:

.....

Telephone:

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

.....
(Partner No. 1)

Signature: Print Name:

Name:

Address:

.....

Telephone:

Date:

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

.....
(Partner No. 2)

Signature: Print Name:
.....

Name:

Address:

.....

Telephone:

Date:

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

.....
(Partner No. 3)

Signature: Print Name:

Name:

Address:
.....

Telephone:

Date:

C. COMPULSORY ENTERPRISE QUESTIONNAIRE

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

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: CIDB registration number, if any:

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

* Complete only if sole proprietor or partnership and attach separate page if more than 3 partners

Section 5: Particulars of companies and close corporations

Company registration number

Close corporation number

Tax reference number

Section 6: Record in the service of the state

Indicate by marking the relevant boxes with a cross, if any sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months in the service of any of the following:

☐ a member of any municipal council ☐ a member of any provincial legislature ☐ a member of the National Assembly or the National Council of Province ☐ a member of the board of directors of any municipal entity ☐ 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 sole proprietor, partner, director, manager, principal shareholder or stakeholder	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 7: Record of spouses, children and parents in the service of the state

Indicate by marking the relevant boxes with a cross, if any spouse, child or parent of a sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months been in the service of any of the following:

☐ a member of any municipal council ☐ a member of any provincial legislature ☐ a member of the National Assembly or the National Council of Province ☐ a member of the board of directors of any municipal entity ☐ 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
--	---

Name of spouse, child or parent	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

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise:

- i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;
- ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;
- iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;

- iv) confirms that I / we are not associated, linked or involved with any other Tendering entities submitting Tender offers and have 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; and
- v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Signed		Date	
Name		Position	
Enterprise name			

D. RECORD OF ADDENDA TO TENDER DOCUMENTS

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:			
No.	Date	Title or Details	
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Attach additional pages if more space is required.			
Signed		Date	
Name		Position	
Tenderer			

E. PROPOSED AMENDMENTS AND QUALIFICATIONS

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 F.3.8 of the Standard Conditions of Tender referenced in the Tender Data regarding the employer's handling of material deviations and qualifications.

Page	Clause or item	Proposal	
Signed		Date	
Name		Position	
Tenderer			

FORM OF INTENT TO PROVIDE A DEMAND GUARANTEE

If my/our Tender is accepted, I/we will, when required and within the time stipulated, provide a guarantee of

(*) Insurance Company (name)
.....

(of address)
.....

.....

(*) Commercial Bank (Name)
.....

(Branch)
.....

(of address)
.....

.....

to be approved by you, the Employer, for the amount stipulated.

(*) : delete whichever is not applicable.

I/we understand that failure to produce an acceptable Demand Guarantee within the stipulated period is a fundamental breach of Contract, entitling the Employer to:

- (i) withhold all payments which may be due to the Contractor pending compliance with the stipulated requirements to produce an acceptable Demand Guarantee.
- (ii) instruct the Contractor to cease all work pending provision of the Demand Guarantee, and
- (iii) cancel the Contract.

Signed	.....	Date	.....
Print Name	.....	Position	.....
Tenderer	.....		

SCHEDULE OF PROPOSED SUBCONTRACTORS

We notify you that it is our intention to employ the following Subcontractors for work in this contract.

If we are awarded a contract we agree that this notification does not change the requirement for us to submit the names of proposed Subcontractors in accordance with requirements in the contract for such appointments. If there are no such requirements in the contract, then your written acceptance of this list shall be binding between us.

We confirm that all Subcontractors who are contracted to construct a house are registered as home builders with the National Home Builders Registration Council.

No	Name and address of proposed Subcontractor	Nature and extent of work	Previous experience with Subcontractor.
1.			
2.			
3.			
4.			
5.			
Signed		Date	
Name		Position	
Tenderer			

F. SCHEDULE OF AVAILABLE INFRASTRUCTURE, RESOURCES AND EXPERIENCE

1. Tenderer's List of Third Party Design Engineers

In the event that the Tenderer desires to design all or part of the Works or submit any alternative, he/she shall list here-following, the Design Engineers, accomplished in the specific field of practice, which he/she proposes to employ for the purpose of third party certification of all works designed by the Tenderer for the Works.

- Notes: (i) All costs of third party designs shall be borne solely by the Tenderer.
(ii) This Schedule must be accurately completed. Phrases such as "to be advised" will not be accepted.

Section of Works	Name and Address of Registered Engineer				ECSA Registration No.

2. Tenderer's Personnel Profile

Key Staff Permanently employed, of foreman level and above	Number of staff
Sub-Total	
Other Permanent Staff	Number of staff
Sub-Total	
Temporary Staff	Number of staff
Sub-Total	
Total	

3. List the Firms who provide the following services:

Service	Name	Contact Person	Telephone
Accounting			
Auditing			
Insurance			
Legal			

4. Identify any amounts of money loaned to your enterprise, indicating the loan source, date and amount

Loan Source	Address	Date of Loan	Loan Amount

5. List a maximum of five contract which your enterprise is engaged in and has not yet completed

Contract Description	Location	Client	Contract Amount	Expected Completion (month & year)

6. List the four largest assignments completed by your enterprise in the last three years

Nature of Work Performed	Client	Consultant Contact Person	Telephone No.	Contract Amount

7. Address of workshop facilities from where maintenance of works will be undertaken

.....

8. Address of Branch Offices in the RSA

.....

9. Address of Nearest Representative to Polokwane

.....

10. Has work previously been performed for the Employer?

YES/NO* -

Specify

.....

11. Tenderer's Financial Ability to execute and complete the Works

Provide the estimated cash flow on the project in terms of submissions of payment certificates or payment schedules of the Employer

NOTES APPLICABLE:

- (i) Value added tax to be included in all amounts
- (ii) Assume for the purpose of this estimate, payment of certificates within 30 days after receipt by the Employer.

- (iii) In calculation of the last column,

$$\begin{array}{ll} j = d & m = l + g \\ k = j + e & n = m + h \\ l = k + f & \text{etc} \end{array}$$

Month No. in Contract Period	Estimated amount in Rands (VAT included)			
	a Received	b Payments made	a-b Net cash flow	Cumulative cash flow
1	-		d	j
2			e	k
3			f	l
4			g	m
5			h	n
6			etc.	etc.
7				
8				
9				
10				
11				
12				
Maximum negative cash flow. Take the largest negative number in the last column and write in here → → → → →				
Signed			Date	.....

Print Name	.....	Position	.....
Tenderer	.....		

- (iv) Failure to detail the required information, shall automatically signify that the Tenderer lacks the infrastructure and resources necessary to execute and complete the Works

G. FINANCIAL INFORMATION OF TENDERER

This information sheet has to be filled in by the financier of the Tenderer, duly signed and stamped on behalf of the financial institution he represents.

Tenderer Details

Tender Description :

Contract Period :

Name of Tenderer :

Bank Account Number :

Tendered Amount :

Demand Guarantee will be provided by this Bank: YES ☐ NO ☐

If yes, state amount of Demand Guarantee: R
.....

Financial Institution

Name of Commercial Bank :

Branch :

Name of Bank Manager :

Telephone Number :

I / We acting on behalf of the above Commercial Bank confirm that

.....
(Tenderer)

has operated an account with us for the last years.

We have been requested to provide a bank rating based in relation to the financial capability of the Tenderer, taking into account directives set out in the following two tables.

Financial Capability	
Maximum value of contract that the Tenderer is considered capable of	Value on which Bank Rating must be used
up to R300 000	R24 000
R1 000 000	R78 000
R3 000 000	R240 000
R5 000 000	R480 000

R10 000 000	R900 000
R30 000 000	R2 400 000
R100 000 000	R7 800 000

BANK RATING	
Bank Code	Description of Bank Code
A	Undoubted for the amount of enquiry
B	Good for the amount of enquiry
C	Good for the amount quoted if strictly in the way of business
D	Fair trade risk for amount of enquiry
E	Figures considered too high
F	Financial position unknown
G	Occasional dishonours
H	Frequent dishonours

The value on which our Bank Rating of the Tenderer is based is R.....

(In words only)

ANNEXURE: B

H. CERTIFICATE FOR MUNICIPAL SERVICES AND PAYMENTS

TO: MUNICIPAL MANAGER, POLOKWANE MUNICIPALITY

FROM: _____ (Name of Tenderer)

FURTHER DETAILS OF TENDERER(S); DIRECTORS/SHAREHOLDERS/PARTNERS, ETC.

Directors/shareholders/Partner	Physical address of the Business	Municipal Account No.	Physical residential address of the Director/ Shareholder/ Partner	Municipal Account No.

NB: Please attach certified copy of ID document(s)

Signatory

Date

Witnesses

1. _____
Full Names

Signature

Date

2. _____
Full Names

Signature

Date

ANNEXURE: C

**I. AUTHORISATION FOR DEDUCTION OF OUTSTANDING AMOUNTS
OWED TO COUNCIL**

TO: MUNICIPAL MANAGER, POLOKWANE MUNICIPALITY

FROM: _____ (Name of the Tenderer or Consortium)

I, _____ the undersigned, hereby authorise the Polokwane Municipality to deduct the full amount outstanding by the business organisation/Director/Shareholder/Partner, etc. from any payment due by us/me.

Signed at _____ Date _____ Month _____ 20 _____

Print Name: _____

Signature: _____

Thus done and signed for and on behalf of the Tenderer/Contractor

Signatory

Date

Witnesses

1. _____
Full Names **Signature** **Date**

2. _____
Full Names **Signature** **Date**

J. DECLARATION OF TENDERER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1. This Municipal Tendering Document must form part of all Tenders invited.
2. It serves as a declaration to be used by municipalities and municipal entities in ensuring that when goods and services are being procured, all reasonable steps are to combat the abuse of the supply chain management system.
3. **The of any Tenderer may be rejected if the Tenderer, or any of its directors have:**
 - a) Abused the Municipality's Supply Chain Management System or committed any improper conduct in relation to such system:
 - b) Been convicted for fraud or corruption during the past five years:
 - c) Wilfully neglected, reneged or failed to comply with any government, municipal or public sector contract during the past five years; or
 - d) Been listed in the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corruption Activities Act (No 12 of 2004).
4. **In order to give effect to the above, the following questionnaire must be completed and submitted with the Tender.**

ITEM	QUESTION	YES	NO
4.1	Is the Tenderer or any of its directors listed on the National Treasury's database as a company or person 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 National Treasury after the audi alteram partem rule was applied).		
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 Corruption Activities Act (No 12 of 2004)? (To access this Register enter the National Treasury's website www.treasury.gov.za, click on the icon "Register for Tender Defaulters" or submit your written request for a hard copy of the Register to facsimile number (012 326 5445).		
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?		
4.3.1	If so, furnish particulars:		
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 any other municipality/municipal entity, that is in arrears for more than three months?		
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?		
4.5.1	If so, furnish particulars:		

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM TO BE TRUE AND CORRECT.

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

Signature

Date

Position

Name of Tenderer

K. DECLARATION OF INTEREST

1. No Tender will be accepted from persons in the service of the State*.
2. Any person, having a kinship with persons in the service of the State, including a blood relationship, may make an offer/s in terms of this invitation to Tender. In view of possible allegations of favouritism, should the resulting Tender, or part thereof, be awarded to persons connected with or related to persons in service of the State, it is required that the Tenderer or their authorised representative declare their position in relation to the evaluating/adjudicating authority and/or take an oath declaring his/her interest.
3. In order to give effect to the above, the following questionnaire must be completed and submitted with the Tender.

Full Name: _____

Identity No: _____

Company Registration No: _____

Tax Reference No: _____

VAT Registration No: _____

Are you at present in the service of the State? **Yes/No**

If so, furnish particulars

- **Municipal Supply Chain Management Regulation:** "In the service of the State" means to be –
 - (a) A member of –
 - (i) Any Municipal council;
 - (ii) Any Provincial legislature; or
 - (iii) The National Assembly or National Council of Provinces
 - (b) A member of board of directors of any municipal entity;
 - (c) An official of any municipality or municipal entity;
 - (d) An employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No. 1 of 1999);
 - (e) A member of Parliament or provincial legislature.
 - (f) A member of the accounting authority of any national or provincial public entity; or
 - (g) An employee of Parliament or a provincial legislature

Have you been in the service of the State for the past twelve months? **YES/NO**

If so, furnish particulars.

Do you have any relationship (family, friend, other) with persons in the service of the State and who may be involved with the evaluation or adjudication of this Tender?
YES/NO

If so, furnish particulars.

Are you aware of any relationship (family, friend, other) between a Tenderer and any persons in the service of the State who may be involved with the evaluation or adjudication of this Tender? **YES/NO**

If so, furnish particulars?

Are any of the company's directors, managers, principle shareholders or stakeholders in service of the State? **YES/NO**

If so, furnish particulars.

Are any spouses, child or parent of the company's directors, managers, principle shareholders or stakeholders in service of the State? **YES/NO**

If so, furnish particulars?

CERTIFICATION

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT. I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

Signature

Date

Position

Name of Tenderer

This document must be signed and submitted together with your Tender

L. THE NATIONAL INDUSTRIAL PARTICIPATION PROGRAMME

INTRODUCTION

The National Industrial Participation (NIP) Programme, which is applicable to all government procurement contracts that have an imported content, became effective on the 1 September 1996. The NIP policy and guidelines were fully endorsed by Cabinet on 30 April 1997. In terms of the Cabinet decision, all state and parastatal purchases / lease contracts (for goods, works and services) entered into after this date, are subject to the NIP requirements. NIP is obligatory and therefore must be complied with. The Industrial Participation Secretariat (IPS) of the Department of Trade and Industry (DTI) is charged with the responsibility of administering the programme.

1 PILLARS OF THE PROGRAMME

1.1 The NIP obligation is benchmarked on the imported content of the contract. Any contract having an imported content equal to or exceeding US\$ 10 million or other currency equivalent to US\$ 10 million will have a NIP obligation. This threshold of US\$ 10 million can be reached as follows:

- (a) Any single contract with imported content exceeding US\$10 million.or
- (b) Multiple contracts for the same goods, works or services each with imported content exceeding US\$3 million awarded to one seller over a 2 year period which in total exceeds US\$10 million. or
- (c) A contract with a renewable option clause, where should the option be exercised the total value of the imported content will exceed US\$10 million. or
- (d) Multiple suppliers of the same goods, works or services under the same contract, where the value of the imported content of each allocation is equal to or exceeds US\$ 3 million worth of goods, works or services to the same government institution, which in total over a two (2) year period exceeds US\$10 million.

1.2 The NIP obligation applicable to suppliers in respect of sub-paragraphs 1.1 (a) to 1.1 (c) above will amount to 30 % of the imported content whilst suppliers in respect of paragraph 1.1 (d) shall incur 30% of the total NIP obligation on a *pro-rata* basis.

1.3 To satisfy the NIP obligation, the DTI would negotiate and conclude agreements such as investments, joint ventures, sub-contracting, licensee production, export promotion, sourcing arrangements and research and development (R&D) with partners or suppliers

A period of seven years has been identified as the time frame within which to discharge the obligation

2. REQUIREMENTS OF THE DEPARTMENT OF TRADE AND INDUSTRY

- 2.1 In order to ensure effective implementation of the programme, successful Tenderers (contractors) are required to, immediately after the award of a contract that is in excess of **R10 million** (ten million Rands), submit details of such a contract to the DTI for reporting purposes.
- 2.2 The purpose for reporting details of contracts in excess of the amount of R10 million (ten million Rands) is to cater for multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as provided for in paragraphs 1.1.(b) to 1.1. (d) above.

3 TENDER SUBMISSIONS AND CONTRACT REPORTING REQUIREMENTS OF TENDERERS AND SUCCESSFUL TENDERERS (CONTRACTORS)

- 3.1 Tenderers are required to sign and submit this Standard Tendering Document (SBD 5) together with the Tender on the closing date and time.
- 3.2 In order to accommodate multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as indicated in sub-paragraphs 1.1 (b) to 1.1 (d) above and to enable the DTI in determining the NIP obligation, successful Tenderers (contractors) are required, immediately after being officially notified about any successful Tender with a value in excess of R10 million (ten million Rands), to contact and furnish the **DTI with the following information:**
- Tender / contract number.
 - Description of the goods, works or services.
 - Date on which the contract was accepted.
 - Name, address and contact details of the government institution.
 - Value of the contract.
 - Imported content of the contract, if possible.
- 3.3 The information required in paragraph 3.2 above must be sent to the Department of Trade and Industry, Private Bag X 84, Pretoria, 0001 for the attention of Mr Elias Malapane within five (5) working days after award of the contract. Mr Malapane may be contacted on telephone (012) 394 1401, facsimile (012) 394 2401 or e-mail at Elias@thedti.gov.za for further details about the programme.

4 PROCESSES TO SATISFY THE NIP OBLIGATION

- 4.1 Once the successful Tenderer (contractor) has made contact with and furnished the DTI with the information required, the following steps will be followed:
- (a) the contractor and the DTI will determine the NIP obligation;
 - (b) the contractor and the DTI will sign the NIP obligation agreement;

- (c) the contractor will submit a performance guarantee to the DTI;
- (d) the contractor will submit a business concept for consideration and approval by the DTI;
- (e) upon approval of the business concept by the DTI, the contractor will submit detailed business plans outlining the business concepts;
- (f) the contractor will implement the business plans; and
- (g) the contractor will submit bi-annual progress reports on approved plans to the DTI.

4.2 The NIP obligation agreement is between the DTI and the successful Tenderer (contractor) and, therefore, does not involve the purchasing institution

Tender number Closing date:.....

Name of Tenderer.....

Postal address

.....

Signature..... Name (in print).....

Date.....

M. DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (ALL APPLICABLE TAXES INCLUDED)

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

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

1.1 If yes, submit audited annual 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 Municipality for more than three months or any other service provider in respect of which payment is overdue for more than 30 days?

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 more than 30 days.

2.2 If yes, provide particulars.

.....

.....

.....

.....

* Delete if not applicable

3 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**

3.1 If yes, furnish particulars

.....

.....

4 Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any 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 STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION
PROVE TO BE FALSE.**

.....
Signature

.....
Date

.....
Position

.....
Name of Tenderer

MBD 6.2

N. DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT

This Municipal Tendering Document (MBD) must form part of all Tenders invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, Tenderers must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2011 and the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:201x.

1. General Conditions

- 1.1. Preferential Procurement Regulations, 2011 (Regulation 9. (1) and 9. (3) make provision for the promotion of local production and content.
- 1.2. Regulation 9.(1) prescribes that in the case of designated sectors, where in the award of Tenders local production and content is of critical importance, such Tenders must be advertised with the specific Tendering condition that only locally produced goods, services or works or locally manufactured goods, with a stipulated minimum threshold for local production and content will be considered.
- 1.3. Regulation 9.(3) prescribes that where there is no designated sector, a specific Tendering condition may be included, that only locally produced services, works or goods or locally manufactured goods with a stipulated minimum threshold for local production and content, will be considered.
- 1.4. Where necessary, for Tenders referred to in paragraphs 1.2 and 1.3 above, a two stage Tendering process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and Specific goals.
- 1.5. A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.
- 1.6. The local content (LC) as a percentage of the Tender price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 201x as follows:

$$LC = 1 - \left(\frac{x}{y} \right) \times 100$$

Where

x imported content

y Tender price excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by the South African Reserve Bank (SARB) at 12:00 on the date, one week (7 calendar days) prior to the closing date of the Tender as required in paragraph 4.1 below.

1.7. A Tender will be disqualified if:

- The Tenderer fails to achieve the stipulated minimum threshold for local production and content indicated in paragraph 3 below; and this declaration certificate is not submitted as part of the Tender documentation.

2. Definitions

- 2.1. **“Tender”** includes advertised competitive Tenders, written price quotations or proposals;
- 2.2. **“Tender price”** price offered by the Tenderer, excluding value added tax (VAT);
- 2.3. **“contract”** means the agreement that results from the acceptance of a Tender by an organ of state;
- 2.4. **“designated sector”** means a sector, sub-sector or industry that has been designated by the Department of Trade and Industry in line with national development and industrial policies for local production, where only locally produced services, works or goods or locally manufactured goods meet the stipulated minimum threshold for local production and content;
- 2.5. **“Duly sign”** means a Declaration Certificate for Local Content that has been signed by the Chief Financial Officer or other legally responsible person nominated in writing by the Chief Executive, or senior member / person with management responsibility (close corporation, partnership or individual).
- 2.6. **“imported content”** means that portion of the Tender price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or its subcontractors) and which costs are inclusive of the costs abroad, plus freight and other direct importation costs, such as landing costs, dock duties, import duty, sales duty or other similar tax or duty at the South African port of entry;
- 2.7. **“local content”** means that portion of the Tender price which is not included in the imported content, provided that local manufacture does take place;
- 2.8. **“stipulated minimum threshold”** means that portion of local production and content as determined by the Department of Trade and Industry; and
- 2.9. **“Sub-contract”** means the primary contractor’s assigning, leasing, making out work to, or employing another person to support such primary contractor in the execution of part of a project in terms of the contract.

3. The stipulated minimum threshold(s) for local production and content for this Tender is/are as follows:

<u>Description of services, works or goods</u>	<u>Stipulated minimum threshold</u>
_____	_____ %
_____	_____ %
_____	_____ %

4. Does any portion of the services, works or goods offered have any imported content?

YES / NO

- 4.1 If yes, the rate(s) of exchange to be used in this Tender to calculate the local content as prescribed in paragraph 1.6 of the general conditions must be the rate(s) published by the SARB for the specific currency at 12:00 on the date, one week (7 calendar days) prior to the closing date of the Tender.

The relevant rates of exchange information is accessible on www.reservebank.co.za.

Indicate the rate(s) of exchange against the appropriate currency in the table below:

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Tenderers must submit proof of the SARB rate (s) of exchange used.

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER No.

ISSUED BY: (Procurement Authority / Name of Municipality / Municipal Entity):
.....

NB The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the Tenderer.

I, the undersigned, (full names),

do hereby declare, in my capacity as
.....

of(name of Tenderer entity), the following:

- (a) The facts contained herein are within my own personal knowledge.
- (b) I have satisfied myself that the goods/services/works to be delivered in terms of the above-specified Tender comply with the minimum local content requirements as specified in the Tender, and as measured in terms of SATS 1286.
- (c) The local content has been calculated using the formula given in clause 3 of SATS 1286, the rates of exchange indicated in paragraph 4.1 above and the following figures:

Tender price, excluding VAT (y)	R
Imported content (x)	R
Stipulated minimum threshold for Local content (paragraph 3 above)	
Local content % as calculated in terms of SATS 1286	

If the Tender is for more than one product, a schedule of the local content by product shall be attached.

- (d) I accept that the Procurement Authority / Municipality /Municipal Entity has the right to request that the local content be verified in terms of the requirements of SATS 1286.
- (e) I understand that the awarding of the Tender is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286, may result in the Procurement Authority / Municipal / Municipal Entity imposing any or all of the remedies as provided for in Regulation 13 of the Preferential Procurement Regulations, 2011 promulgated under the Policy Framework Act (PPFA), 2000 (Act No. 5 of 2000).

SIGNATURE: _____

DATE: _____

WITNESS No. 1 _____

DATE: _____

WITNESS No. 2 _____

DATE: _____

O. CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

- 1 This Municipal Tendering Document (MBD) must form part of all Tenders¹ invited.
- 2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, 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 (or Tender rigging).² Collusive Tendering is a *pe se* prohibition meaning that it cannot be justified under any grounds.
- 3 Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:
 - a. take all reasonable steps to prevent such abuse;
 - b. reject the Tender of any Tenderer if that Tenderer or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and
 - c. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the Tendering process or the execution of the contract.
- 4 This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when Tenders are considered, reasonable steps are taken to prevent any form of Tender-rigging.
- 5 In order to give effect to the above, the attached Certificate of Tender Determination (MBD 9) must be completed and submitted with the Tender:

¹ Includes price quotations, advertised competitive Tenders, limited Tenders and proposals.

² Tender rigging (or collusive Tendering) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a Tendering process. Tender rigging is, therefore, an agreement between competitors not to compete.

S. 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)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying Tender will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the Tenderer to sign this Certificate, and to submit the accompanying Tender, on behalf of the Tenderer;
4. 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;
5. 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
6. 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 consortium³ will not be construed as collusive Tendering.

7. 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) Tendering with the intention not to win the Tender.

8. 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.

9. 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.

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

10. 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

.....
Position

.....
Name of Tenderer

P. COMPLIANCE WITH OHSA (ACT 85 OF 1993)

Tenderers are required to satisfy the Employer and the Engineer as to their ability and available resources to comply with the above by answering the following questions and providing the relevant information required below.

1. Is the Contractor familiar with the OHSA (ACT 85 of 1993) and its Regulations?	YES	/	NO
2. Who will prepare the Contractor's Health and Safety Plan? (Provide a copy of the person/s curriculum vitae/s or company profile).	YES	/	NO
3. Does the Contractor have a health and safety policy? (If yes, provide a copy). How is this policy communicated to all employees?	YES	/	NO
4. Does the Contractor keep records of safety aspects of each construction site? If yes, what records are kept?	YES	/	NO
5. Does the Contractor conduct monthly safety meetings? If yes, who is the chairperson of the meeting, and who attend these meetings?	YES	/	NO
6. Does the Contractor have a safety officer in his employment, responsible for the overall safety of his company? If yes, please explain his duties and provide a copy of his CV.	YES	/	NO
7. Does the Contractor have trained first aid employees? If yes, indicate, who.	YES	/	NO
8. Does the Contractor have a safety induction-training programme in place? (If yes, provide a copy)	YES	/	NO

Signature of Tenderer: **Date:**

Q. ORIGINAL BANK RATING LETTER

Attached the Bank Rating to this Page

R. DAY WORK SCHEDULE

This Day work Schedule shall be used for the valuation of any additional or substituted work which cannot conveniently be valued at the rates and prices submitted in the schedule of quantities.

In respect of labour and materials used in the additional or substituted work not covered in the Day work Schedule the Contractor shall be paid the actual cost plus the percentage allowance stated in the schedule of quantities.

The Tenderer shall quote hereunder rates which shall apply for payment purposes if the Engineer orders additional or substituted work to be carried out on a day work basis and shall therefore be in accordance with the requirements of clause 37(2) of the General Conditions of Contract.

1. LABOUR AND MATERIALS

Rates and prices entered in the schedule shall be held to allow for net cost of labour and materials delivered to site respectively with the percentage allowances stated in the schedule of quantities.

2. PLANT AND EQUIPMENT

The Tenderers shall list all major items of plant and equipment to be used on the works and which may be required for use on day works. The proposed hire rates of these items shall be entered against each type of machine, such rates to include for all relevant costs of plant hire inclusive of fuels and lubricants but exclusive of labour charges for the operators, which will be paid for under sub-clause (1) above.

The rates for plant items not listed in the schedule will be the ruling plant hire rates, inclusive of fuels and lubricants but exclusive of labour charges for the operators, inclusive of a 7,5% handling charge. It is therefore in the Tenderers interest to ensure that the list is complete.

Should there be insufficient space on the pages provided; the Tenderer shall add further pages as required.

THE RATES FOR THE PLANT AND EQUIPMENT MENTIONED IN THE SCHEDULE SHALL BE FILLED IN FOR THE ITEMS REQUESTED. SHOULD AN ITEM BE OMITTED IT SHALL BE DEEMED TO HAVE BEEN INCLUDED IN THE OTHER DAYWORKS RATES.

I. LABOUR

DESIGNATION		RATE	
		R	C
Brick Layers	per hour		
Pipe Layers	per hour		
Plant Operators	per hour		
Truck Drivers	per hour		
Labour - unskilled	per hour		
- semi-skilled	per hour		
- skilled	per hour		

II. MATERIALS

DESIGNATION		RATE	
		R	C
Cement	per 50 kg pocket delivered		
Concrete Sand	per m ³ delivered		
Concrete Aggregate	per m ³ delivered		

III. TRANSPORT

DESIGNATION	RATE	
	R	C
Per cubic metre kilometre		

IV. PLANT AND EQUIPMENT

[illegible]

*Only applicable on authority of the Engineer.

POLOKWANE MUNICIPALITY

PART C1: AGREEMENTS AND CONTRACT DATA

C1.1: FORM OF OFFER AND ACCEPTANCE

C1.2: CONTRACT DATA

C1.3: DEMAND GUARANTEE AND RETENTION MONEY GUARANTEE

**C1.4: AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL
HEALTH AND SAFETY ACT No 85 OF 1993**

C1.5: AGREEMENT WITH ADJUDICATOR

POLOKWANE MUNICIPALITY

PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

C1.1 Form of Offer and Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of construction works viz.:

Project Description:

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

Contract No.: PM47/2023

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 Schedules, and by submitting this offer has accepted the Conditions of Tender.

By the representative of the Tenderer, deemed to be duly authorized, signing this part of this Form of Offer and Acceptance, the Tenderer offers to perform all of the obligations and liabilities of the Contractor under the Contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the Conditions of Contract identified in the Contract Data.

The offered total of the prices inclusive of value-added-tax is

.....

..... (Amount in words); R..... (Amount 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 Contract identified in the Contract Data.

Signature(s)

.....

Print Name(s)

.....

Capacity

For the Tenderer

.....
.....
(Name and address of organization)

Signature of witness.....Date:

Print Name

Important Note

This page to be duly completed by the Tenderer before submitting the Tender.

ACCEPTANCE

By signing this part of this Form of Offer and Acceptance, the Employer 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 1: Agreements and Contract Data (which include this Agreement)

Part 2: Pricing Data

Part 3: Scope of Work

Part 4: Site Information

and drawings and documents or parts thereof, which may be incorporated by reference into parts 1 to 4 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, which shall be signed by the authorized representative(s) of both parties.

The Tenderer shall, within 7 days of 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 guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data. Failure to fulfill any of the 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 copy of this original document, including the Schedule of Deviations (if any). Such date should be confirmed in a manner that can be read, copied and recorded and shall be accepted by the contracting parties as the Commencement Date. This agreement shall constitute a binding contract between the parties.

Signature(s)
.....

Print Name(s)
.....

Capacity
.....

For the Employer
.....

.....
(Name of Organization)
.....
.....
.....

.....
(Address of Organization)

Signature of witness..... Date:

Print Name

SCHEDULE OF DEVIATIONS

The extent of deviations from the Tender documents issued by the Employer before the Tender closing date is limited to those permitted in terms of the Conditions of Tender.

A Tenderer's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid, be the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here.

Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the Tender documents, and which it is agreed by the Parties becomes an obligation of the contract, shall also be recorded here.

Any change or addition to the Tender documents arising from the above agreements and recorded here shall also be incorporated into the final Contract Document.

3.1 Subject

.....
Details

3.2 Subject

.....
Details

3.3 Subject

.....
Details

By the duly authorized representatives signing this Schedule of Deviations, the Employer and the Contractor agree to and accept the foregoing Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the Contractor and the Employer in concluding this process of offer and acceptance; in witness thereof the parties hereto have caused this agreement to be executed.

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 Contractor of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this Agreement.

Signed by: Signed by:

Print Name: Print Name:
.....

Address:

Address:

.....

.....

.....

For and on behalf of the **Employer** in the
Presence of

For and on behalf of the **Contractor** in the
presence of

Witness:

Witness:

.....

Print Name:

Print

Name:

.....

Date:

Date:

.....

POLOKWANE MUNICIPALITY
(Not to be completed at tender stage)

C1.3 Performance Guarantee

In accordance with clause 6.2.1 of General Conditions of Contract, 2nd Edition 2010

Contract No: -----

Description of Contract: -----

GUARANTOR DETAILS AND DEFINATIONS

“Guarantor” means: -----

----- (Please put name of firm)

Please address: -----

Postal address: -----

Tel:-----

Fax: -----

“Employer” means: **POLOKWANE MUNICIPALITY.**

“Contractor” means: -----

----- (Please put name of firm)

“Guarantee sum” means: 10% of the contract amount

“Engineer” means: -----

“Works” means: Permanent works together with temporary works

“Site” means: The land and other places, made available by the Employer for the purpose of the contract, on under over in or through which the works are to be executed or carried out.

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

“Contract Sum” means: The accepted amount inclusive for tax of R-----

Amount in words: -----

“Expiry Date” This Guarantee shall expire upon the issue of the **Completion Certificate** issued by Polokwane Municipality signed by the Director of ENGINEERING Services, as such date is advised to the Guarantor in writing confirmed by the Employer.

CONTRACT DETAILS

Engineer issues: Interim Payment Certificates, Final Payment Certificate and the Certificate Completion of the Work as defined in the Contract.

PERFORMANCE GUARANTEE

1. The Guarantor’s liability shall be limited to the amount of the Guaranteed Sum.
2. **Expiry Date”** This Guarantee shall expire upon the issue of the final completion certificate issued by Polokwane Municipality signed by the Director of ENGINEERING Services, as such date is advised to the Guarantor in writing confirmed by the Employer
The Engineer and/or the Employer shall advise the Guarantor in writing of the date on the Certificate of the works has been issued.
3. The Guarantor hereby acknowledges that:
 - 3.1. 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 surety ship;
 - 3.2. Its obligation under this Performance Guarantee is restricted to the payment of money.
4. 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:
 - 4.1. A copy of a first written demand issues by the Employer to the Contractor stating that payment of a sum certified by the Engineer and/ or Employer 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;
 - 4.2. A first written demand issued by the Employer to the Guarantor at the Guarantor’s physical address and / or postal address with a copy to the Contractor stating that

- period of seven (7) days has elapsed since the first written demand terms of 4.1 and the sum certificate has still not been paid;
- 4.3. A copy of the aforesaid payment certificate which entails the Employer to receive payment in terms of the Contract sum in 4.
5. 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 and/ or postal address calling up this Performance Guarantee, such demand stating that:
- 5.1. The contractor has been termination due to the Contractor's default and this performance Guarantee is called up in terms of 5; or
- 5.2. 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
- 5.3. 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.
6. 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.
7. 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.
8. Payment by Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.
9. 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 his Performance Guarantee on account alleged to be prejudicial to the Guarantor.
10. The Guarantor chooses the physical address and postal address as stated above for the service of all notices for all purposes in connection herewith.
11. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after on claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
12. 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.
13. 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 Court 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.

Sign at -----

Date -----

Guarantor's signatory (1) -----

Capacity -----

Guarantor's signatory (2) -----

Capacity -----

Witness signatory (1) -----

Witness signatory (2) -----

RETENTION MONEY GUARANTEE
(Not to be completed at tender stage)

In accordance with clause 6.2.1 of General Conditions of Contract, 2nd Edition 2010

Contract No: -----

Description of Contract: -----

GUARANTOR DETAILS AND DEFINATIONS

“Guarantor” means: -----

----- (Please put name of firm)

Please address: -----

Postal address: -----

Tel:-----

Fax: -----

“Employer” means: **POLOKWANE MUNICIPALITY.**

“Contractor” means: -----

----- (Please put name of firm)

“Guarantee sum” means: 10% of the contract amount

“Engineer” means: -----

“Works” means: Permanent works together with temporary works

“Site” means: The land and other places, made available by the Employer for the purpose of the contract, on under over in or through which the works are to be executed or carried out.

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

“Contract Sum” means: The accepted amount inclusive for tax of R-----

Amount in words: -----

“Expiry Date” This Guarantee shall expire upon the issue of the **Completion Certificate** issued by Polokwane Municipality signed by the Director of ENGINEERING Services, as such date is advised to the Guarantor in writing confirmed by the Employer.

CONTRACT DETAILS

Engineer issues: Interim Payment Certificates, Final Payment Certificate and the Certificate Completion of the Work as defined in the Contract.

RETENTION GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.
2. Expiry Date" This Guarantee shall expire upon the issue of the final completion certificate issued by Polokwane Municipality signed by the Director of ENGINEERING Services, as such date is advised to the Guarantor in writing confirmed by the Employer. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on the Certificate of the works has been issued.
3. The Guarantor hereby acknowledges that:
 - 3.1. 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 surety ship;
 - 3.3. Its obligation under this Retention Guarantee is restricted to the payment of money.
4. 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:
 - 4.1. A copy of a first written demand issues by the Employer to the Contractor stating that payment of a sum certified by the Engineer and/ or Employer 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;
 - 4.2. A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address and / or postal address with a copy to the Contractor stating that period of seven (7) days has elapsed since the first written demand terms of 4.1 and the sum certificate has still not been paid;
 - 4.3. A copy of the aforesaid payment certificate which entails the Employer to receive payment in terms of the Contract sum in 4.
5. 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 and/ or postal address calling up this Performance Guarantee, such demand stating that:

- 5.1. The contractor has been terminated due to the Contractor's default and this Retention Guarantee is called up in terms of 5; or
- 5.2. A provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Retention Guarantee is called up in terms of 5; and
- 5.3. 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.
6. 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.
7. 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.
8. Payment by Guarantor in terms of 5 will only be made against the return of the original Retention Guarantee by the Employer.
9. 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 his Retention Guarantee on account alleged to be prejudicial to the Guarantor.
10. The Guarantor chooses the physical address and postal address as stated above for the service of all notices for all purposes in connection herewith.
11. This Retention Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after on claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
12. This Retention 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.
13. Where this Retention Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Court 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.

Sign at -----

Date -----

Guarantor's signatory (1) -----

Capacity -----

Guarantor's signatory (2) -----

Capacity -----

Witness signatory (1) -----

Witness signatory (2) -----

POLOKWANE MUNICIPALITY

C.1.2 Contract Data

CONTENTS

C.1.2.1 Part 1: Data provided by the Employer

C.1.2.1.1 Conditions of Contract

C.1.2.1.2 Contract-specific Data

C.1.2.1.2.1 Compulsory Data

C.1.2.1.2.2 Variations to the General Conditions of Contract

C.1.2.1.2.3 Additional clauses to the General Conditions of Contract

C.1.2.1 Part 1: Data provided by the Employer

C.1.2.1.1 Conditions of Contract

The Conditions of Contract are:

- the “General Conditions of Contract” as they appear in the commercially-available publication “General Conditions of Contract for Construction Works, Second Edition, 2010”, hereinafter referred to as “GCC 2010”; and
- specific data as contained in this Contract Data.

Each party to the Contract shall purchase its own copy of the GCC 2010 that applies to this Contract, available from its publisher:

South African Institution of Civil Engineering
Private Bag X200
Halfway House
1685
South Africa

Tel +27 (0)11 805 5947

The following Notes apply:

Note 1

The GCC 2010 makes several references to the Contract Data.

Each item of data below is cross-referenced to the clause in the Conditions of Contract to which it applies. Notwithstanding anything specified to the contrary, the Contract Data shall take precedence in the interpretation of any ambiguity or inconsistency between it and the GCC 2010.

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purpose of interpretation, the priority of the documents shall be in accordance with the following order of precedence:

- (a) the Form of Offer and Acceptance.
- (b) amendments to the General Conditions of Contract within the Contract Data.
- (c) additional conditions to the General Conditions of Contract within the Contract Data.
- (d) corrigenda to the General Conditions of Contract.
- (e) the General Conditions of Contract.
- (f) the Specifications, Drawings, Schedules and other documents forming part of the Contract (in that order) contained in the Scope of Work and the Site Information.

If any ambiguity or discrepancy is found in the documents, the Engineer needs to be contacted to issue any necessary clarification or instruction.

Note 2

Certain pro-forma forms and pro-forma agreements contained in the GCC 2010 have been adapted for this particular contract. Those pro-forma forms and pro-forma agreements contained in the GCC 2010 do not apply where replaced by similar pro-forma forms and pro-forma agreements in this document.

C.1.2.1.2 Contract-specific Data

The following contract-specific data, referring to the General Conditions of Contract, are applicable to this Contract:

C.1.2.1.2.1 Compulsory Data

Clause	Data
1.1.1.13	The Defects Liability Period is 12 months
1.1.1.14	The time for achieving Practical Completion is 18 months
1.1.1.15	The name of the Employer is Polokwane Municipality
1.1.1.26	The Pricing Strategy of a Re-measurement Contract shall apply
1.2.1.2	The address of the Employer is: Physical address: Civic Centre Landdros Mare Street Polokwane City Postal address: PO Box 111 Polokwane 0700 e-mail address: MashiloS@polokwane.gov.za Contact numbers: Corporate: 015 290 2346 Direct: 015 290 2202 Fax: 015 290 2174
1.1.1.16	The name of the Engineer is: Makone Consulting Engineers (Pty) Ltd

Clause	Data																																								
1.2.1.2	The address of the Engineer is: Physical address: 33 Compensatie Street Portion 716 Polokwane, 0700 Postal address: P.O Box 1198 Fauna Park Polokwane e-mail address: info@makone.co.za Contact numbers: Corporate: (015) 290 4790 Mobile: 079 890 6291 Fax: (086) 621 2686																																								
3.1.3	The Engineer shall obtain the specific approval of the Employer before executing any of his functions or duties according to the following table: <table><tr><th>GCC Clause No</th><th>Description</th><th>Requires EWA*</th><th>Delegated to ER*</th></tr><tr><td>3.2.1</td><td>Engineer's Representative's appointment and termination</td><td>Y</td><td></td></tr><tr><td>3.2.4</td><td>Engineer's Representative acting on Engineer's behalf</td><td>Y</td><td></td></tr><tr><td>4.5.4</td><td>Payment for notices and fees</td><td>Y</td><td></td></tr><tr><td>4.7.1</td><td>Fossils, etc on Site</td><td>Y</td><td></td></tr><tr><td>5.7.2</td><td>Work at night</td><td>Y</td><td></td></tr><tr><td>5.7.3</td><td>Acceleration of rate of progress</td><td>Y</td><td></td></tr><tr><td>5.7.3</td><td>Payment for acceleration</td><td>Y</td><td></td></tr><tr><td>5.9.1</td><td>Instructions and drawings on Commencement Date</td><td></td><td>Y</td></tr><tr><td>5.11.1</td><td>Suspension of the Works</td><td></td><td>Y</td></tr></table>	GCC Clause No	Description	Requires EWA*	Delegated to ER*	3.2.1	Engineer's Representative's appointment and termination	Y		3.2.4	Engineer's Representative acting on Engineer's behalf	Y		4.5.4	Payment for notices and fees	Y		4.7.1	Fossils, etc on Site	Y		5.7.2	Work at night	Y		5.7.3	Acceleration of rate of progress	Y		5.7.3	Payment for acceleration	Y		5.9.1	Instructions and drawings on Commencement Date		Y	5.11.1	Suspension of the Works		Y
GCC Clause No	Description	Requires EWA*	Delegated to ER*																																						
3.2.1	Engineer's Representative's appointment and termination	Y																																							
3.2.4	Engineer's Representative acting on Engineer's behalf	Y																																							
4.5.4	Payment for notices and fees	Y																																							
4.7.1	Fossils, etc on Site	Y																																							
5.7.2	Work at night	Y																																							
5.7.3	Acceleration of rate of progress	Y																																							
5.7.3	Payment for acceleration	Y																																							
5.9.1	Instructions and drawings on Commencement Date		Y																																						
5.11.1	Suspension of the Works		Y																																						

Clause	Data		
	5.11.3	Proceeding with Works after suspension	Y
	5.12.4	Acceleration instead of extension of time	Y
	5.13.2	Reduction in penalty	Y
	6.3.1	Variation orders	Y
	GCC Clause No	Description	Requires EWA*
	6.3.2.1	Confirmation of a Variation Order	Y
	6.4.1.4	Dayworks as a Variation Order	Y
	6.5.2	Materials for dayworks	Y
	6.8.4	Costs due to changes in legislation	Y
	6.11.1	Variations exceeding 20%	Y
	8.2.2.2	Damage due to excepted risks	Y
	10.1.5	Consultation on Contractor's claim	Y
	10.1.5	Ruling on Contractor's claim	N
	*The following abbreviations apply: ER Engineer's Representative EWA Engineer's Written Action N No NA Not Applicable Y Yes		
3.1.4	Delete this clause.		
4.9.1	The Contractor shall deliver to the Engineer, on a monthly basis, a detailed inventory of Construction Equipment kept on Site, full particulars given for each day of the month. Distinction shall be made between Owned Equipment and Hired Equipment as well as Equipment in working order and Equipment out of order. Such inventory shall be submitted by the seventh day of the month following the month to be reported.		

Clause	Data
4.10.2	The Contractor shall deliver to the Engineer, on a monthly basis, a return in detail of supervisory staff and the number of categorized classes of labour employed each day for the said period by the Contractor for execution of the Contract. Such return shall be submitted by the seventh day of the month following the month to be reported.
5.3.1	The documentation required before commencement with Works execution are: Health and Safety Plan (Refer to Clause 4.3) A signed Agreement between the Employer and the Contractor for the Works to be completed by the Contractor in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act (Act No.85 of 1993) and the Construction Regulations promulgated thereunder (Refer to Clause 4.3). Proof of payment to the Employer, that the Contractor has paid all contributions required in terms of the Compensation for Occupational Injuries and Diseases Act, No 130 of 1993 (Refer to Clause 4.3). Initial programme (Refer to Clause 5.6). Security (Refer to Clause 6.2). Insurance (Refer to Clause 8.6).
5.3.2	The time to submit the documentation required before commencement with Works execution is 14 Days .
5.4.2	The access and possession of Site shall not be exclusive to the Contractor but shall be as set out elsewhere in the Contract.
5.8.1	The non-working Days are Sundays. The special non-working Days are: Statutory public holidays; and All annual year-end shutdown periods as recommended by the South African Federation of Civil Engineering Contractors (SAFCEC), and which commence after the Commencement Date and which commence before the Due Completion Date.
5.13.1	The penalty for failing to complete the Works is 0,1 percent of contract price per calendar day.
5.16.3	The latent defect period is 10 years, commencing on the Day after the date of certification of Practical Completion.
6.5.1.2.3	The percentage allowance to cover overhead charges is: 50 per cent for labour; and 15 per cent for materials.

Clause	Data
6.8.2	Contract Price Adjustment (CPA) will be applicable and will be applied as follows: The value of the payment certificates is to be adjusted in accordance with the Contract Price Adjustment Schedule – this will be for all items excepting those mentioned as special items below (in sub-clause 6.8.3). The applicable factors are: $x = 0.10$; $a_1 = 0.12$ (Labour); $a_2 = 0.03$ (Local Labour); $b = 0.20$ (Plant); $c = 0.55$ (Material); and $d = 0.10$ (Fuel) as per tables indicated in GCC. The base month is the month prior to the month in which the tender closes. The base rate for Local Labour will be the minimum of R191.60/day.
6.8.3	The special materials variation is applicable for this contract and will be for structural steel as described below. Special adjustment for structural steel : Use SEIFSA CPA with following factors: $x = 0.10$; $a = 0.2$ (as per Table C3 for Labour) (All Hourly Paid Employees); $b = 0.15$ (Plant); $c = 0.55$ (as per Table E-A Hot Rolled Steel Coils for Material); $d = 0.10$ (as per Table L1(A)-L2(A) Road Freight Costs In lieu of Fuel), as per table G1: Construction Material Purchases The base month is the month prior to the month in which the tender closes.
6.10.1.5	The percentage advance on materials not yet built into the Permanent Works is 80%. Proof of ownership is required.
6.10.3	The limit of retention money is 10% of the value of the Contract Price. A Retention Money Guarantee is compulsory. A penalty will be applied for non-delivery of the Retention Money Guarantee as required. The penalty will be 10% of the value of the completion Retention Money Amount per calendar month for late delivery of the said Retention Money Guarantee.
8.6.1.1.2	The value of Plant and materials supplied by the Employer to be included in the insurance sum is nil .
8.6.1.1.3	The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is a maximum of 10% (ten percent) of the Contract Sum.
8.6.1.3	The limit of indemnity for liability insurance is equal to the contract amount.
10.5.1	Dispute resolution shall be by standing adjudication, use GCC 2010, Appendix 5.
10.7.1	The determination of disputes shall be by arbitration.

C.1.2.1.2.2 Variations to the General Conditions of Contract

Clause	Data
2.5.1	Cession <i>Amend Clause 2.5.1 as follows:</i> <i>Delete the words “without the written consent of the other”</i>
5.14.5.1	Consequences of Completion <i>Amend Clause 5.14.5.1 as follows:</i> <i>In the second line, substitute the word ‘Guarantor’ with ‘Contractor’.</i>
6.2	Security <i>Replace Sub-Clauses 6.2.1 and 6.2.2 with:</i> “The Contractor shall deliver to the Employer within such time as may be stated in the Contract Data, a Demand Guarantee, of an Insurance Company registered in terms of the Short-term Insurance Act (Act 53 of 1998) or of a registered Commercial Bank, in a sum equal to the amount stated in the Contract Data. The Demand Guarantee shall be issued by an entity subject to the approved of the Employer, and shall conform in all respects to the format contained in the Contract Data. The security to be provided by the Contractor shall be a Demand Gurantee of 10% of the Contract Sum. Wherever a joint venture constitutes the contracting party, the Demand Guarantee shall be issued on behalf of the joint venture. Failure to produce an acceptable Demand Guarantee within the period stated in the Contract Data, is a fundamental breach of Contract, entitling the Employer to cancel the Contract by due notice in terms of Clause 9.2 with specific reference to Sub-clause 9.2.2 as amended in the Contract Data.”

Clause	Data
6.3.1	Variations <i>Amend Clause 6.3.1, as follows:</i> <i>In the first paragraph, third line, after the words "or for any reason appropriate", add the phrase</i> <i>", including the limiting of contract expenditure so as not to exceed the Employer's budgeted project funding, "</i> <i>Add the following phrase to the last paragraph of Clause 6.3.1.6, after the words "ascertaining the amount of the Contract Price":</i> <i>", and no such variation shall give reason for consideration of any claim in terms of Clause 6.11."</i>
6.3.2	Orders for Variations to be in writing Omit the words "Provided that" under Clause 6.3.2 and omit Clause 6.3.2.1.
6.9.2	Definition of "materials" <i>Amend Clause 6.9.2, as follows:</i> <i>Substitute the word 'plant' with 'Plant'.</i>
6.10.1	Interim Payments <i>Amend Clause 6.10.1.5 as follows:</i> <i>In the third line, add the words 'not yet' before the words 'built into'</i>
6.10.5	Payment of retention money <i>Amend Clause 6.10.5 as follows:</i> <i>In the second line, add the words ', if any,' after the words 'Defects Liability Period'</i>
6.10.6	Set-off and delayed payments <i>Amend Clause 6.10.6.2 as follows:</i> <i>Delete the words 'simple interest' and substitute with the words 'interest compounded monthly'.</i> <i>Delete the words 'Contractor's Bank' and substitute with the words 'Employer's Bank'</i>

Clause	Data
6.11	Variations exceeding 15 per cent <i>Replace the marginal heading with:</i> “Variations exceeding 20 per cent” <i>Replace “15 per cent” with “20 per cent” in the text of this Sub-Clause</i>
7.4.4	Cost of test specimens and tests <i>Amend Clause 7.4.4.2 as follows:</i> In the <u>second</u> line of paragraph two, add the words ‘the requirements of’ before the words ‘the Contract’
7.8.2	Cost of making good of defects <i>Amend Clause 7.8.2.1 as follows:</i> <i>In the first line, correct the spelling of ‘therefore’.</i>
8.1.3	Excessive loads and traffic In the third line, add a comma after the word ‘Site’ as follows: ‘in the vicinity of the Site, from’.
8.3.1	Excepted risks <i>Amend Clause 8.3.1.10 as follows:</i> <i>In the second line, delete the words ‘Employer or any of their’ and substitute with ‘or any of its’.</i>
8.6.6	Contractor to produce proof of payment “The Contractor shall before commencement of the Works produce to the Engineer: 8.6.6.1 The policies by which the insurances are effected, 8.6.6.2 Proof that due payment of all premiums there under, covering the full required period has been made, and 8.6.6.3 Proof of continuity of the policies for the required period.

Clause	Data
	Should, during the currency of the Contract, the required period of insurance be extended for any reason, the Contractor shall timeously extend (so as to maintain) the said insurances for the full extended duration. The Engineer shall be empowered to withhold all payment certificates until the Contractor has complied with his obligations in terms of this Clause 8.6.6.”
8.6.7	Remedy on Contractor’s failure to insure <i>Delete sub-clause 8.6.7 and substitute with:</i> “Failure on the part of the Contractor to effect and keep in force any of the insurances referred to in Clause 8.6.1 and its sub-clauses, is a fundamental breach of Contract, entitling the Employer to cancel the Contract by due notice in terms of Clause 9.2 and with specific reference to sub-clause 9.2.2, as amended in the Contract Data.”
9.1.2	State of emergency <i>In the <u>fourth</u> line, delete the words ‘supply of’ and substitute with ‘availability of’.</i>
9.2	Termination by Employer <i>Delete the contents of Clause 9.2 and substitute with:</i> “9.2.1 The Employer may terminate the Contract by written notice to the Contractor if: 9.2.1.1 Sequestration of the Contractor’s estate is ordered by a Court with due jurisdiction, or 9.2.1.2 The Contractor publishes a notice of surrender or presents a petition for the surrender of his estate as insolvent, or makes a compromise with his creditors, or assigns in favour of his creditors, or agrees to carry out the Contract under the supervision of a committee representing his creditors, or (being a company) goes into liquidation, whether provisionally or finally (other than a voluntary liquidation for the purpose of amalgamation or reconstruction), or if the Contractor assigns the Contract without having first obtained the Employer’s consent in writing, or if execution is levied on his goods, or 9.2.1.3 The Contractor, or anyone on his behalf, or in his employ, offers to any person in the employ of the Employer or the Engineer, a gratuity or reward or commission, or 9.2.1.4 The Contractor furnished materially inaccurate information in his Tender, which had a bearing on the award of the Contract, or 9.2.1.5 The Contractor has abandoned the Contract.

Clause	Data
	9.2.2 If the Contractor: 9.2.2.1 Has failed to commence the Works in terms of Clause 10 hereof, or has suspended the progress of the Works for fourteen (14) days after receiving from the Engineer written notice to proceed, or 9.2.2.2 Has failed to provide the Guarantee in terms of Clause 7 within the time stipulated in the Contract Data, or 9.2.2.3 Has failed to proceed with the Works with due diligence, or 9.2.2.4 Has failed to remove materials from the Site or to pull down and replace work within fourteen (14) days after receiving from the Engineer written notice that the said materials or work have been condemned and rejected by the Engineer in terms of these conditions, or 9.2.2.5 Is not executing the Works in accordance with the Contract, or is neglecting to carry out his obligations under the Contract, or 9.2.2.6 Has, to the detriment of good workmanship or in defiance of the Engineer's instructions to the contrary, sublet any part of the Contract, or 9.2.2.7 Has assigned the Contract or any part thereof without the Employer's consent in writing, then the Employer may give the Contractor 14 days notice to rectify the default, and if the Contractor fails to rectify the default in said 14 days, then, without further notice, notify the Contractor in writing of the termination of the Contract and expel the Contractor and order the Contractor to vacate the site within 24 hours of issue of the Notice of Termination and to hand the Site over to the Employer, and the Employer may then enter upon the Site and the Works without affecting the rights and powers conferred on the Employer or the Engineer by the Contract and the Employer may himself complete the Works or may employ another contractor to complete the Works, and the Employer or such other contractor may use for such completion so much of the Construction Equipment, Temporary Works and materials brought onto the Site by the Contractor as the Employer may think proper, and the Employer may at any time sell any of the said Construction Equipment, Temporary Works and unused materials and apply the proceeds of sale towards payment of any sums that may be due or become due to the Employer by the Contractor under the Contract. In such circumstances the Contractor shall forthwith vacate the Site and shall not be entitled to remain on the Site on the grounds that he is entitled to do so on a right of retention until amounts due to him have been paid, neither will the Contractor be entitled to any further payments in terms of this Contract.

Clause	Data
	9.2.3 If the Contractor, having been given notice to rectify a default in terms of 9.2.2 above, rectifies said default, but later repeats the same or substantially the same default, then the Employer may notify the Contractor of the immediate termination of the Contract, and proceed as stated in the paragraph following the word 'writing' in Clause 9.2.2.7 above.
	9.2.4 Should the amounts that the Employer must pay to complete the Works, exceed the sum that would have been payable to the Contractor on due completion by him, then the Contractor shall upon demand pay to the Employer the difference, and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly. Provided that should the Contractor on demand not pay the amount of such excess to the Employer, such sum may be determined and deducted by the Employer from any sum due to or that may become due to the Contractor under this or any previous or subsequent contract between the Contractor and the Employer."

C.1.2.1.2.3 Additional clauses to the General Conditions of Contract:

Clause	Data
1.1	Definitions <i>Add the following at the end of Sub-Clause 1.1.1:</i> 1.1.1.35 “Client”, as used in the Occupational Health and Safety Act - Construction Regulations, means Employer. 1.1.1.36 “Principal Contractor”, as used in the Occupational Health and Safety Act - Construction Regulations, means Contractor.
4.12	Contractor’s superintendence <i>Add the following sub-clause 4.12.4 to Clause 4.12:</i> “Where a form is included in the Contract Data for this purpose, the Tenderer shall fill in the name of the person he proposes to entrust with the post of Contractor’s Site Agent on this Contract in the space provided therefore. Previous experience of this person on work of a similar nature during the past five (5) years is to be entered on the form. The Contractor’s Site Agent shall be on Site at all times when work is being performed. The person shall be subject to approval of the Engineer in writing and shall not be replaced or removed from Site without the written approval of the Engineer.”
5.6	Programme <i>Add the following sub-clause 5.6.6 to Clause 5.6:</i> “Failure on the part of the Contractor to deliver to the Engineer, the • programme of the Works in terms of Clause 5.6.1 and • supporting documents in terms of Clause 5.6.2 Within the period stated in the Contract Data, shall be sufficient cause for the Engineer to retain 25 per centum of the value of the Fixed Charge and Value-related items in assessment of amounts due to the Contractor, until the Contractor has submitted aforementioned first Programme of the Works and Supporting Documents”.

Clause	Data
5.9.7	Engineer to approve Contractor's Designs and Drawings <i>Add the following sub-clause 5.6.6 to Clause 5.6:</i> "All designs, calculations, drawings and operation and maintenance manuals shall be fully endorsed by a third party registered engineer, accomplished in such specific field of practice and the cost thereof shall be borne solely by the Contractor. Once the alternative design has been approved, the Contractor shall indemnify and hold harmless the Engineer, the Employer, their agents and assigns, against all claims howsoever arising out of the said design, whether in contract or delict".
5.11	Suspension of the Works <i>Add the following sub-clause 5.11.4 to Clause 5.11:</i> "If the Contractor does not receive from the Employer the amount due under an Interim Payment Certificate within 28 days after expiry of the time stated in sub-clause 6.10.4 within which payment is to be made (except for deductions in accordance with sub-clauses 6.10.1.6 and 6.10.1.7), the Contractor may, after giving 14 days' notice to the Employer, suspend the progress of the Works. The Contractor's action shall not prejudice his entitlements to a claim in terms of Clause 10.1 and to cancellation of the Contract in terms of Clause 9.3. If the Contractor subsequently receives full payment of the amount due under such Interim Payment Certificate before giving a notice of cancellation of the Contract, the Contractor shall resume normal working as soon as is reasonably practicable."
5.12	Extension of Time for Practical Completion <i>Add the following at the end of Sub-Clause 5.12.2.2:</i> "The extension of time to be allowed due to abnormal rainfall shall be calculated separately for each calendar month or part thereof in accordance with the following formula: $V = (Nw - Nn) + \frac{Rw - Rn}{x}$ where

Clause	Data		
	V	=	Extension of time in calendar days for the calendar month under consideration
	Nw	=	Actual number of days during the calendar month on which a rainfall of 10 mm or more has been recorded
	Nn	=	Average number of days for the calendar month on which a rainfall of 10 mm or more has been recorded, as derived from existing rainfall records
	Rw	=	Actual recorded rainfall for the calendar month
	Rn	=	Average rainfall for the calendar month, as derived from existing rainfall records
	x	=	20
	The rainfall records which shall provisionally be accepted for calculation purposes are: Based on records taken at: Rainfall Station : Polokwane 		

Clause	Data
	The factor (Nw - Nn) shall be considered to represent a fair allowance for days during which rainfall exceeds 10 mm and the factor (Rw - Rn)/x shall be considered to represent a fair allowance for those days when rainfall does not exceed 10 mm but wet conditions prevent or disrupt work. The total extension of time shall be the algebraic sum of all monthly totals for the contract period, but if the algebraic sum is negative the time for completion shall not be reduced due to subnormal rainfall. Extensions of time for a part of a month shall be calculated using pro rata values of Nn and Rn.” For this project the rainfall formula will only apply as background information, or dispute resolution. Extension of time for rainfall will only be granted on Actual Delays experienced; noted and agreed upon by the engineer.
6.10	Payments <i>Add the following at the end of Sub-Clause 6.10.1:</i> “The Contractor shall complete the ‘Contractor’s Monthly Report Schedule’, which pro forma documentation is obtainable from the Engineer. Pursuant to Sub-Clause (1), these, duly signed by all concerned, together with the Contractor’s statement and a VAT invoice in original format are to be submitted to the Engineer. Issue by the Engineer to the Employer and Contractor of any signed payment certificate is conditional to this information being fully endorsed, accurately and timeously submitted to the Engineer”.
	<i>Add the following at the end of Sub-Clause 6.10.1.5:</i> “All documentary evidence of such materials shall be unambiguous with respect to ownership having fully passed to the Contractor on or before the date of submittal of the Contractor’s monthly statement. Should the Contractor fail to supply unambiguous documentary evidence, he shall, prior to submittal of his monthly statement, deliver to the Employer a Guarantor Guarantee in the form contained in the Appendices to the Contract Data.”
9.3	Termination by the Contractor <i>Add the following at the end of Sub-Clause 9.3:</i>

Clause	Data
	9.3.5 “In addition to, or as an alternative to the rights to termination contained in this Clause 9.3, the Contractor may notify the default to the Employer, with a copy to the Engineer, and if the default is not rectified within 10 days the Contractor may suspend progress of the works until a date 7 days after the default is rectified. The Contractor shall be entitled to extension of time to the extent of delay caused by or resulting from such suspension, and to payment of additional costs caused by or resulting from the suspension. Such extension of time and additional costs shall be promptly ascertained by the Engineer, who shall then grant the extension of time and include the additional costs in all future payment certificates. Such suspension, extension of time and/or payment of additional costs, shall not prejudice the Contractor’s rights to cancel the contract.”

C.1.2.2Part 2: Data provided by the Contractor

The General Conditions of Contract, as specified in Part 1, shall be used as a basis for this Data which is required to be completed.

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

Clause	Data
1.1.1.9	The Name of the Contractor is:
1.2.1.2	The address of the Contractor is: Physical address:

Clause	Data
1.2.1.2	Postal address: e-mail address: Contact numbers: Corporate: Direct: Mobile: Fax:

C1.4 OCCUPATIONAL HEALTH AND SAFETY AGREEMENT

This agreement is mandatory for all contractors appointed by the Polokwane Municipality or any other institution that do work for or on behalf of Municipality.

This agreement is between:

THE CONTRACTOR:

Herein represented by

.....

In his capacity asBeing duly authorized hereto hereinafter referred to as "contractor".

Compensation Commissioner Number:

(Attach a copy of the Registration Certificate to this agreement)

Company : Name:

.....

	Registration	Number:
		
CEO	:	Name:
.....		
	ID	Number:
		
	Physical	Address:
		
		

And the POLOKWANE MUNICIPALITY
(Hereinafter referred to as “the Council”)

1. DEFINITIONS

1.1 CONTRACTOR Means the “Contractor” as defined in the “Principal Contract”.

Annexed hereto in his capacity as mandatory.

1.2 MANDATORY Includes an agent, contractor or subcontractor for work to be done or service rendered, but without derogating from his status in his own right as an employer of people or user of equipment, machinery, tools or materials.

1.3 THE PRINCIPAL CONTRACT Means the contract annexed hereto as annexure “A”.

1.4 COUNCIL Means the Polokwane Municipality

1.5 RISK CONTROL OFFICER A person appointed in writing by Council.

1.6 Any definitions contained in any Statute hereinafter mentioned shall have the meaning allocated to it by the specific statute.

2. OBJECTIVE

2.1 Whereas Council and the Contractor have entered into a contract for service (work) as fully indicated in the “Principle Contract” and whereas the “Contractor” agreed to indemnify Council against the risks stated hereunder whether foreseeable or not, and, whereas it is agreed between the parties that it is of cardinal importance to safeguard both Council and the Contractor’s obligation in terms of relevant legislation as well as to extend the obligation as a company and/or legal person and/or person as an entity concerned with health, safety and the environment.

2.2 These rules are applicable to all contractors performing work for Council within the jurisdictional area of the Council and on any premises, which are owned, rented or developed by the Council.

2.3 The Council acts through those officials or persons who are generally or specifically charged with the responsibility, in terms of legislation, as well as any other official or person who is generally or specifically charged with the control and supervision of the project.

IT IS HEREBY AGREED AS FOLLOWS:

3. INDEMNITIES

3.1 The “Contractor” hereby indemnifies the “Council” against any loss in respect of all claims, proceeding, damages, costs and expenses arising out of any claim or

proceeding pertaining to the non compliance by the “Contractor” of any statutory requirements and/or requirements regarding the following Acts in particular pertaining to the provisions of:

- 3.1.1 The Occupational Health and Safety Act 85 of 1993 (as amended), including the Construction Regulations, 2003 as promulgated on 18 July 2003, in terms of Section 43 of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), in Government Gazette No. 25207 and Regulation Gazette No. 7721. See Annexure B.
 - 3.1.2 The Health Act 63 of 1977.
 - 3.1.3 Road Traffic Act 29 of 1989 (as amended).
 - 3.1.4 Environment Conservation Act 73 of 1989.
 - 3.1.5 The National Water Act 36 of 1998.
 - 3.1.6 The Criminal Procedure Act 51 of 1977.
 - 3.1.7 The Explosives Act 26 of 1956.
 - 3.1.8 The Arms and Ammunition Act 75 of 1969.
 - 3.1.9 Compensation for Occupational Injuries and Diseases Act 130 of 1993.
 - 3.1.10 The Labour Relations Act 66 of 1995.
 - 3.1.11 The Unemployment Insurance Act 30 of 1966 (as amended).
 - 3.1.12 The Basic Conditions of Employment Act 75 of 1997 (as amended).
 - 3.1.13 Standards Act 29 of 1993.
 - 3.1.14 any statutory provisions in any act and/or any law or bylaw of any local government and/or any published official standard incorporated into any statute or bylaw relating to the completion of the work set out in the “Principal Contract”.
 - 3.1.15 Any other health and safety standard prescribed by the “Council”.
- 3.2 The “Contractor” shall ensure that he familiarizes himself with the requirements of the above legislation and that he, his employees and any subcontractor will comply with all the statutory provisions contained in them.
 - 3.3 The “Contractor” shall indemnify the “Council” in respect of any physical loss or damage to any plant, equipment or other property belonging to the “Contractor” or for which he is responsible and he hereby indemnifies the “Council” against any loss in respect of all claims, proceedings, damages, costs and expenses consequent upon the loss of or damage to any plant, equipment or other property belonging to, or which is the responsibility of, any subcontractor, agent or employee of the subcontractor.
 - 3.4 The “Contractor” shall and hereby indemnifies the “Council” against any liability, loss, claim or proceedings whatsoever, whether arising in common law or by statute, consequent on personal injuries to or the loss of health or death of any person whosoever arising out of or in the course of or caused by the execution of the “Principal Contract”.
 - 3.5 The “Contractor” shall and hereby indemnifies the “Council” against any liability, loss, claim or proceedings consequent on loss of or damage to any movable or immovable property arising out of or in the course of or caused by the execution of the “Principal Contract” and due to any act or omission of the “Contractor”, his agents, servants or subcontractors.

4. PERFORMANCE SAFE WORKING PRACTICE

- 4.1 The “Council” requires a high standard of safe work performance from all employees and expects that the standard be maintained by the “Contractor” within the “Council’s” jurisdictional area or on its premises.
- 4.2 Irrespective of human considerations, the maintaining of these health and safety rules shall be the execution of the prescribed legal requirements. These rules are not to hinder the “Contractor” in rendering services or indemnify the “Contractor” from any legal responsibility to ensure healthy and safe work circumstances.
- 4.3 The “Council” shall assist the “Contractor” in any practical considerations to accommodate the healthy and safe execution of work and therefore require co-operation in the execution of these safety rules.

5. LOCK OUT PROCEDURE

- 5.1 When power or air driven machines or equipment, electrical apparatus or pipe lines are examined, repaired, adjusted, cleaned, lubricated or serviced in any other way than normal servicing, then all isolating switches, -levers, valves or appliances must be put in the “off” or “closed” position and locked.
- 5.2 Should more than one team work on a machine, then each person in control of a team, must put a separate lock on the switch, lever, valve or appliance.

6. CRANES, VEHICLES AND HOISTING

6.1 For each crane or hoisting equipment used, the “Contractor” must submit a valid and recent test certificate or other form of the last examination of the machine or equipment, to the “Council”.

6.2.1 Only trained personnel with written permission and where determined by Law, with a valid driver’s license, may be allowed to operate any electrical diesel or petrol driver overhead crane, hydraulic or electrical hoisting equipment, self driven forklift, tractor or any other crane or vehicle. No employee of the “Contractor” may perform any overhead work or work on an overhead crane or hoisting equipment or work near cranes or crane rail, before:

- i) An agreement was concluded with the “Council”.
- ii) Approval has been obtained from the “Council” to perform the work.
- iii) All applicable danger – and warning symbolic signs are put into position, or exemption, if applied for, is in operation.

6.3 The “Contractor” shall be wholly responsible for any loss or damage to cranes, hoisting equipment, plant, machines or equipment brought onto the work site by the “Contractor”

7. MACHINE VALANCES, PROTECTION AND FENDING

7.1 No machine valances, protection or fending may be removed from machines, manholes, etc without the written permission of “Council” if applicable exemption procedures were not appropriated.

8. SCAFFOLD, LADDERS, TOOLS AND EQUIPMENT

8.1 No equipment or appliance belonging to “Council” may be used without written permission from “Council”.

8.2 Unless prior arranged, “Contractors” must bring sufficient tools and equipment to the site to finish the contract, including offices and storerooms. The mentioned equipment remains the responsibility of the “Contractor” with respect to loss, damage and theft.

8.3 In exceptional cases, where tools and equipment belonging to “Council” are used to finish the contract, the said equipment and tools are used on own risk and the “Contractor” indemnifies “Council” from any claims that may arise. The said indemnity must be in writing, as well as information regarding the loan period, identification and condition of tools and equipment. The “Contractor” is responsible for the returning of said tools and equipment in the same condition or better. The “Contractor” is responsible to “Council” for any damage or excessive wear of such tools or equipment and material.

9. EXCAVATIONS

- 9.1 Before any excavations commence, written permission must be obtained from “Council” to confirm the location of existing electrical cables, water pipes, etc.
- 9.2 All excavations and obstructions in floor, tar and dirt surfaces must be fenced effectively and safeguarded between sundown and sunup with a sufficient amount of red/yellow warning lights and symbolic signs.
- 9.3 The surrounding area must be kept clean, safe and tidy during excavation. Excess material may not obstruct unnecessarily.
- 9.4 If any property is in danger during excavation, it must be supported and the proposed support work must be submitted to the Department of Labour (OHS) and “Council” for approval.
- 9.5 Written permission must be obtained from “Council” to grant admittance to restricted areas as well as areas where dangerous or poisonous gases are present.

10. FIRST AID

- 10.1 The “Contractor” must provide and maintain a first aid box equipped according to legal requirement where more than (5) five persons are employed. The first aid box must be in the care of a person with a competency certificate from one of the following organizations:
 - (i) SA Red Cross Association;
 - (ii) St Johns Ambulance;
 - (iii) SA First Aid League; or
 - (iv) A person or organization approved by the Chief inspector for this purpose.
- 10.2 A visible notice must be put up on any work premises with the name of the person responsible for first aid. In an emergency “Council’s” Ambulance / Fire Department or emergency services may be contacted at (015) 290 2000.

11. FLAMMABLE LIQUIDS

- 11.1 The “Contractor” shall be held responsible for the necessary precautionary fire prevention measures. No smoking signs must be put up where applicable. The “Contractor’s” employees must be informed of “Council’s” fire prevention measures and evacuation procedures.

12. COMPENSATION BY CONTRACTOR

- 12.1 The “Contractor” shall be held responsible for all loss of and damage to property, the death or injury of persons, the resultant loss or damage suffered as well as all law suits, claims, costs, charges, fines and expenses due to negligence, violation of statutory liability or neglect of the “Contractor” or the “Contractor’s” employees.

13. TRANSGRESSION OF RULES AND MISBEHAVIOUR

- 13.1 The “Contractor” is warned that any act(s) leading to damage or loss of employees of the “Contractor” or the “Council” shall not be tolerated. The “Council” may (without any reason) demand that any employee of the “Contractor” be withdrawn from the principal “Contract” or site.

14. INCIDENT REPORTING

- 14.1 All incidents referred to in Section 24 of the Occupational Health and Safety Act and or other incidents shall be reported, by the “Contractor”, to the Department of Labour, as well as to the “Council” and should such an incident take place outside normal working hours, on a Saturday, Sunday or Public holiday provided with a written report relating to any incident.
- 14.2 The “Council” will obtain an interest in the issue of any formal inquiry conducted in terms of the Occupational Health and Safety Act in any incident involving the “Contractor” and/or his employees and/or his subcontractors.
- 14.3 The “Contractor” undertakes to report to “Council” anything deemed to be unhealthy and/or unsafe and that he undertakes to verse his employees and/or subcontractors in this regard.

15. LIAISON AND SUPERVISION

15.1 The “Contractor” hereby undertakes to liaise on a regular basis with the designated Risk Control Officer and “Council” representative regarding any hazards or incidents that may be identified or encountered during the performance of the “Principal Contract”.

16. SERVICE INTERRUPTION

16.1 Should any work done by the “Contractor” cause a possible interruption, written permission must be obtained from “Council”, before such work commences. The “Contractor” may not switch on or off any compressed air, steam, oxygen, vacuum supply or electrical supply without written permission from the “Council”.

17. CONFIDENTIALITY

17.1 The “Contractor” and his employees shall regard all data, documentation and information of the contract and related documentation as confidential.

17.2 Lost documentation/plans or related documentation shall immediately be reported in writing to the “Council”.

17.3 The “Contractor” shall not put up any advertisements or billboard at the site without permission.

17.4 The “Contractor” shall not take photographs of the contract site or part thereof or any work process or part thereof, without written permission from the “Council”, or have photographs taken, published or let it be published.

18. CONTRACT SITE AND PRESERVATION

18.1 Employees of the “Contractor” shall not be allowed entrance to the site unless a valid identity document, issued by “Council”, is displayed. The mentioned documents shall only be valid for a limited period, where after it must be renewed.

19. COMPLETION OF WORK

19.1 The “Contractor” or his employees shall not leave the contract site before the “Council” is satisfied that the contract is completed according to the requirements and standards set out in the contract and that the working site is left in a satisfactory and safe condition.

20. LIQUOR, DRUGS, DANGEROUS WEAPONS AND FIREARMS

- 20.1 The “Contractor” shall ensure that no liquor, drugs, dangerous weapons or firearms be brought onto the premises.

21. SEARCHES

- 21.1 The “Contractor” and any person engaged in the contract work may at any time be searched by “Council” appointed security personnel and all packages, suitcases, etc. must be presented to the access control point for examination prior to them being brought onto the property or leaving the property.

22. GENERAL CONDITIONS

22.1 Notwithstanding anything to the contrary in this agreement, it is hereby specifically determined that the “Contractor-“

22.1.1 shall have acquainted himself and be conversant with the contents of all statutory provisions applicable to the health and safety of workers and other persons on the site including the execution of the work, and in particular the conditions contained in the Occupational Health and Safety Act, 1993 (Act 85/1993), and the regulations promulgated in terms thereof, and shall comply therewith meticulously and in all aspects and/or take care that it is complied with;

22.1.2 shall be obliged to immediately execute all instructions given to him by an authorized representative of “Council” in order to ensure and uphold the implementation and enforcement of the provisions referred to in sub-paragraph 1, to the satisfaction of the said representative;

22.1.3 shall indemnify the “Council” against any or all liability which may be incurred by the “Council” as a result of the omission of the “Contractor”, his employees, sub-contractors and/or representatives to comply with the provisions referred to in sub-paragraph 1, or to ensure that it shall be complied with;

22.1.4 shall undertake to pay upon demand any and/or all legal costs and other expenses which “Council” may have incurred as a consequence of any criminal charges or other proceedings pending against, or involving the “Council” as a result of the contravention or non-compliance by the “Contractor”, his employees, sub-contractors and/or representative of any of the statutory provisions referred to in sub-paragraph 1.

22.1.5 Should the “Contractor” neglect to immediately execute any health and safety written orders issued to him, or to his employee in charge of the works, in terms of the stipulations of sub-paragraph 2, the “Council” shall be entitled to suspend the execution of the works and take the necessary steps to execute or have such order executed. Under these circumstances the contractor shall be obliged to pay “Council”, upon demand, all costs and expenses incurred by “Council”, in order to execute or have the said orders executed.

22.1.6 Should the abovementioned steps not establish a healthy and safe work environment the “Council” will be entitled to terminate the contract without incurring any further costs or claims from the contractor?

23. “CONTRACTOR” IDENTIFICATION BOARD

23.1 The “Contractor” shall provide on any work premises a temporary identification board containing at all worksites the following information:

- Company name on behalf of which division/department the work is being done.
- The contact number and name of the person representing the “Contractor”.

- The contact number and name of the person representing “Council”

24. ACKNOWLEDGEMENT

- 24.1 The “Contractor” hereby acknowledges that he has read and received a copy of the “Principal Contract” and agrees to be bound by and undertakes to observe all the terms and conditions of the “Principal Contract”. This appointment is made in terms of Section 37(2) of the Occupational Health and Safety Act, 85 of 1993.

25. EXCEPTIONS AND OMISSIONS

26. REMARKS

THE CONTRACTOR

SIGNED AT ON THIS DAY OF

WITNESSES:

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

THE COUNCIL

SIGNED AT ON THIS DAY OF

WITNESSES:..... 1.
THE COUNCIL
2.

b) INDEMNITY CERTIFICATE

Contractor:

.....

Employer: Polokwane Municipality

Contract:

.....

I/we

.....

Hereafter the "Contractor"

"Contractor" hereby indemnifies the Polokwane Municipality (Council) against any claim of whatever sort which may arise directly or indirectly from the execution by me/us of the above-mentioned contract and which may be instituted against "Council", as well as of any loss or damage which the "Council" suffers or expenditure the "Council" incurs to prevent responsibility for such claim, loss or damage, whatever the cause of such claim may be or whatever loss or damage the "Council" suffers.

THUS done and signed at on this
day of

..... 20.....

WITNESSES:

1.

CONTRACTOR

2.

COUNCIL

R2
REVENUE
STAMP

c) ACKNOWLEDGEMENT CERTIFICATE

I, _____ in _____ my _____ capacity
as.....

Duly authorized hereto
representing

..... Contractors,
acknowledge receipt
of a copy of the Polokwane Municipality's safety manual for contractors and the under
mentioned person as my supervisor regarding all works and services which must be executed
by the Contractor. The appointment is done in terms of the Occupational Health and Safety
Act, 1993 (Act 85/1993).

SIGNED _____ AT _____ ON
..... 200...

I, accept the
abovementioned appointment, and declare that I am familiar with the contents of the
Polokwane Municipality's Safety Manual for contractors
CASUALTIES REGISTRATION NUMBER

SIGNED _____ AT _____ ON
..... 200....

SIGNATURE:

WITNESSES: 1.

2.

A copy of this certificate shall be submitted to the "Council" before any work commences.

R2
REVENUE
STAMP

C1.5: Agreement with Adjudicator

This agreement is made on the.....day of 20.....between: the Employer

(name of company / organisation).....

of (address).....

.....and the Contractor

(name of company / organisation)

.....

of (address).....

.....

(hereinafter called **the Parties**)

and

(name).....

of (address).....

.....

(hereinafter called **the Adjudicator**)

Disputes or differences may arise/have arisen* between the Parties under a Contract dated.....

and known as Contract No.....

(Contract title).....

and these disputes or differences shall be/have been* referred to adjudication in accordance with the CIDB Adjudication Procedure, (hereinafter called "**the Procedure**") and the Adjudicator may be or has been requested to act.

(* Delete as necessary)

IT IS NOW AGREED as follows:

1. The rights and obligations of the Adjudicator and the Parties shall be as set out in the Procedure.
2. The Adjudicator hereby accepts the appointment and agrees to conduct the adjudication in accordance with the Procedure.

3. The Parties bind themselves jointly and severally to pay the Adjudicator's fees and expenses in accordance with the Procedure as set out in the Contract Data.
4. The Parties and the Adjudicator shall at all times maintain the confidentiality of the adjudication and shall endeavour to ensure that anyone acting on their behalf or through them will do likewise, save with the consent of the other Parties which consent shall not be unreasonably refused.
5. The Adjudicator shall inform the Parties if he intends to destroy the documents which have been sent to him in relation to the adjudication and he shall retain documents for a further period at the request of either Party.

SIGNED by:

(Signature): (Signature):
(Signature):

Name: **Name:** **Name:**

who warrants that he/ she is who warrants that he/ she is the **Adjudicator** in the
duly authorised to sign for and duly authorised to sign for presence of
on behalf of the **First Party** in and on behalf of the **Second**
the presence of **Party** in the presence of

Witness: **Witness:** **Witness:**

(Signature).....
(Signature).....
(Signature).....

Name: **Name:** **Name:**

Address: Address: Address:

Date: Date: Date:

POLOKWANE MUNICIPALITY

**PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF
OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW
INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE**

C2.1 Pricing Instructions

1. GENERAL

The pricing instructions describe the criteria and assumptions which will be assumed in the Contract that the Bidder has taken into account when developing his prices. The Bills of Quantities record the Contractor's rates for providing supplies, services, engineering and construction works in accordance with the Scope of Work.

The terms of payment and the provisions for price adjustment, if applicable, are established in the Contract Data. These items are not described in the Pricing Data.

The Bidder's obligations in pricing the Bidder offer and the Employer's undertakings in the checking and correction of arithmetical errors are dealt with in the Standard Conditions of Bidder contained in Annexure F of SANS 294, as amended in and read in conjunction with the Bidder Data.

2. DOCUMENTS MUTUALLY EXPLANATORY

The documents forming the Contract are to be taken as mutually explanatory of one another. The Bill of Quantities forms an integral part of the Contract Documents and shall be read in conjunction with the Bidder Data, Contract Data, Scope of Work, Site Information General and Special Conditions of Contract, the Specifications and the Drawings.

3. DEFINITIONS

For the purpose of this Bill 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 Scope of Work and Site Information.
Quantity	:	The number of units of work for each item.
Rate	:	The payment per unit of measurement at which the Contractor Contracts to do the work.
Amount	:	The product of the quantity and the rate Biddered for an item.
Sum	:	An amount contracted for an item, the extent of which is described in the Bill of Quantities, the specifications or elsewhere but the quantity of work of which is not measured in any units.

4. DESCRIPTIONS

Descriptions in the Bill of Quantities are abbreviated and comply generally with those in the Standardised Specifications. Clause 8 of each Standardised Specification, read together with the relevant clauses of the Scope of Work, set out what ancillary or associated activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standardised Specification, or the Scope of Work, conflict with the terms of the Bill, the requirements of the Standardised Specification or Scope of Work, as applicable, shall prevail.

5. REFERENCES

The clauses in a specification in which further information regarding the schedule item can be obtained appear under "Reference clause" in the Bill. The reference clauses indicated are not necessarily the only sources of information in respect of scheduled items. Further information and specifications may be found elsewhere in the contract documents. Standardised Specifications are identified by the letter or letters which follow SABS in the SABS 1200 series of specifications, eg. G for SABS 1200 G.

6. UNITS OF MEASUREMENT

The units of measurement indicated in the Bill of Quantities are metric units.

The following abbreviations are used in the Bill of Quantities:

%	=	per cent
h	=	hour
ha	=	hectare
kg	=	kilogram
kl	=	kilolitre
km	=	kilometre
km-pass	=	kilometre-pass
kW	=	kilowatt
l	=	litre
m	=	metre
mm	=	millimetre
MN	=	meganewton
MN-m	=	meganewton-metre
MPa	=	megapascal
m ²	=	square metre
m ³	=	cubic metre
m ³ -km	=	cubic metre-kilometre
m ² -pass	=	square metre-pass
no	=	number
PC sum	=	Prime Cost sum
Prov Sum	=	Provisional Sum
sum	=	lump sum
t	=	ton (1 000 kg)

7. NET MEASUREMENTS

Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for off-cuts and waste.

8. QUANTITIES

The quantities set out in these Bills of Quantities are approximate and do not necessarily represent the actual amount of work to be done. The quantities of work accepted and certified for payment will be used for determining payments due and not the quantities given in the Bills of Quantities.

The Contract Amount to be determined in accordance with the conditions of contract identified in the Contract Data shall be computed from the actual quantities of authorized work done, value at rates determined in terms of the Contract Data, against the respective items in the Bill of Quantities.

9. CURRENCY

All rates and sums of money quoted in the Bill of Quantities shall be in Rand and whole cents. Fractions of a cent shall be discounted.

10. VALUE ADDED TAX

Value Added Tax shall be excluded from the rates and sums contracted for the various items of work included in the Bill of Quantities. VAT will be added as a single entry to the summary.

11. RATES AND PRICES

11.1 General

- a) The Contractor must price each item in the Bill of Quantities in BLACK INK. Reproduced computer printouts of the Bills of Quantities will not be acceptable.
- b) The rates and prices to be inserted in the Bill of Quantities shall cover all the services and incidentals for the work described under the several items. Such prices and rates shall cover all costs and expenses that may be required in and for the execution of the work described, and shall cover the cost of all general risks, liabilities and obligations set forth or implied in the documents on which the Bidder is based, as well as overhead charges and profit. Reasonable prices shall be inserted as these will be used as a basis for assessment of payment for additional work that may have to be carried out.
- c) Where the Contractor is required to furnish detailed drawings and designs or other information in terms of the Contract Data, all costs thereof shall be deemed to have been provided for and included in the unit rates and sum amounts contracted for the items scheduled in the Bill of Quantities. Separate additional payments will not be made.

- d) A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered will be considered to be covered by the other prices or rates in the Bill. The Contractor will not be paid for items against which no rate or lump sum has been entered in the Bill of Quantities.
- e) Should the Contractor group a number of items and contract one lump sum for such group of items, this single lump sum shall apply to that group of items and not to each individual item.
- f) Should the Contractor indicate against any item that compensation for such item is included in another item, the rate for the item included in another item shall be deemed nil.
- g) A submission may be regarded as non-responsive if any rates or lump sums in the Bill of Quantities are, in the opinion of the Employer, unreasonable or out of proportion.

11.2 "Rate only" items

The Contractor shall fill in a rate (in the rate column) against all items where the words "rate only" appear in the Amount column, which rate will constitute payment for work which may be done in terms of this item. Such "rate-only" items are used where it is estimated that little or no work will be required under the item or where the item is to be considered as an alternative to another item for which a quantity is given.

11.3 Arithmetic

Excepting where Sum Amounts are required or where Provisional Sums have been indicated, the Contractor shall enter an applicable rate in the Rate Column of the Bill of Quantities for each scheduled item. He shall also enter an appropriate sum in the Amount column for each scheduled item, by determining in the applicable line item the product of the Quantity and the Unit Rate.

If there is an error in the line item resulting from the product of the unit rate and the quantity, the rate shall be binding and the error of extension as entered in the Bidder offer will be corrected by the Employer in determining the Contract Price.

Where there is an error in addition, either as a result of other corrections required by this checking process or in the Bidder's addition of prices, such error will be corrected by the Employer in determining the Contract Price.

11.4 Labour Intensive work

Item numbers in the schedule of quantities suffixed by the letter "L" shall denote a payment item in respect of work which is required to be executed by labour intensive construction methods. Item numbers with the suffix "L" are not necessarily an exhaustive list of all the activities which must be done by hand, and this clause does not over-ride any of the requirements in the generic labour intensive specification in the Scope of Works.

Payment for items which are designated to be constructed labour-intensively (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.

12. VARIATION IN TEXT

No alteration, erasure or addition is to be made in the text of the Bill of Quantities. Should any alteration, erasure or addition be made, it will not be recognized; the original wording of the Bill of Quantities will be adhered to.

POLOKWANE MUNICIPALITY

PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

C2.2 BILL OF QUANTITIES

BILL OF QUANTITIES

Contents

<u>Description</u>	<u>Page</u>
Section 1 Preliminary and General	166
Section 2 Building and Grand Stand Works	170
Section 3 Specialist Works, Civil Works	202
Section 4 Specialist Works Mechanical Installations	224
Section 5 Specialist Works Electrical Installations	246
Contingencies	
Contract Price Adjustment (CPAP)	

BILLS OF QUANTITIES - MAIN SUMMARY

SECTION	DESCRIPTION	AMOUNT
1	PRELIMINARY & GENERAL - SECTION 1	
1.1	PRELIMINARIES & GENERAL	
	SUBTOTAL 1	
2	BUILDING AND GRAND STAND WORKS- SECTION 2	
2.1	FOUNDATIONS	
2.2	PILING	
2.3	CONCRETE, FORMWORK AND REINFORCEMENT	
2.4	MASONRY	
2.5	WATERPROOFING	
2.6	ROOF COVERINGS, CLADDINGS ETC	
2.7	CARPENTRY AND JOINERY	
2.8	CEILINGS, PARTITIONS AND ACCESS FLOORING	
2.9	FLOOR COVERINGS, WALL LININGS, ETC	
2.10	IRONMONGERY	
2.11	STRUCTURAL STEELWORK	
2.12	METALWORK	
2.13	PLASTERING	
2.14	TILING	
2.15	PLUMBING AND DRAINAGE	
2.16	GLAZING	
2.17	PAINTWORK	
2.18	EXTERNAL WORKS (Other scope in civils)	
2.19	PROVISIONAL SUMS	
	SUBTOTAL 2	
3	SPECIALIST WORKS, CIVIL WORKS - SECTION 3	
3.1	SITE CLEARANCE AND DEMOLITIONS	
3.2	EARTHWORKS (Building Platforms,Parking)	
3.3	SEWER	
3.4	WATER	
3.5	STORMWATER	
3.6	ROADS AND PARKING	
3.7	SOFTBALL FIELDS	
	SUBTOTAL 3	
4	SPECIALIST WORKS MECHANICAL INSTALLATIONS - SECTION 4	
4.1	FIRE WATER	
4.2	FIRE DETECTION & ALARM SYSTEM	
4.3	EMERGENCY EVACUATION SYSTEM	
4.4	DOMESTIC WATER SUPPLY	
4.5	SANITARY DRAINAGE	
4.6	HEATING, VENTILATION AND AIR CONDITIONING (HVAC)	
4.7	VERTICAL TRANSPORT (LIFT INSTALLATION)	
	SUBTOTAL 4	

BILLS OF QUANTITIES - MAIN SUMMARY

SECTION	DESCRIPTION	AMOUNT
5	SPECIALIST WORKS ELECTRICAL INSTALLATIONS - SECTION 5.	
5.1	DISTRIBUTION BOARDS	
5.2	MV EQUIPMENT	
5.3	LV EQUIPMENT	
5.4	CABLES	
5.5	EXCAVATION (ELECTRICAL)	
5.6	LUMINAIRES	
5.7	STADIUM LIGHTING	
5.8	POWER & LIGHTING	
5.9	NETWORK INFRASTRUCTURE	
5.10	INTRUDER DETECTION / ACCESS CONTROL	
5.11	CCTV	
5.12	PROVISIONAL SUM (TELEPHONY & IT, DIGITAL SCORE BOARD)	
	SUBTOTAL 5	
	SUB TOTAL 6 (Excluding VAT & Contingencies)	
6	Contingencies (Allow 5%) of Subtotal 6 (The amount reflected here will be utilised on the works should unforeseen conditions warrant it. If not used, it will be deducted in full or in part)	
7	Contract Price Adjustment (CPAP) (Allow 7.5%) of Subtotal 6 (The amount reflected here will be utilised for escalation or on the works should unforeseen conditions warrant it. If not used, it will be deducted in full or in part)	
	SUB TOTAL 7 (Including Contingencies & Excluding VAT)	
8	VAT (15%)	
	TOTAL (Including Contingencies and VAT)(Carried Forward To Form Of Tender)	

BILLS OF QUANTITIES SECTION 1 : PRELIMINARIES AND GENERAL (P&G's)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.1 BILL NO. 1 PRELIMINARIES BUILDING AGREEMENT AND PRELIMINARIES i) The Agreement is to be the General Conditions of Contract for Works of Civil Engineering Construction (2010) (Second Edition), published by the South African Institution Of civil Engineering ii) The Preliminaries are to be the Construction and management requirements for works contracts Part 1: General engineering and construction works (SANS 1921-1: 2004 Edition 1) prepared by Standards South Africa and shall be deemed to be incorporated herein iii) Tenderers are referred to the abovementioned documents for the full intent and meaning of each clause thereof (hereinafter referred to by heading and clause number only) for which such allowance must be made as may be considered necessary iv) Where standard clauses or alternatives are not entirely applicable to this contract such modifications, corrections or supplements as will apply are given under each relevant clause heading v) Where any item is not relevant to this specific contract such item is marked N/A (signifying "not applicable") vi) Adjustment of the preliminaries: each item priced, is to be allocated to one or more of the three categories, where "F" denotes a fixed amount (amount not to be varied), "V" denotes an amount variable in proportion to value and "T" denotes an amount in proportion to time vii) Time (T) related Preliminaries will only be adjusted for omissions or additions, issued by the Employer, or delays caused by the Employer only, for which variation and extension of time has been granted viii) These bills of quantities have been drawn up in accordance with the Standard System of Measuring Building Work 1999 Sixth Edition (revised) published by the Association of South African Quantity Surveyors unless otherwise described viii) The Model Preambles for Trades 2008 as published by the Association of South African Quantity Surveyors shall be deemed to be incorporated in the Section 2 bills of quantities and no claims arising from brevity of description of items fully described in the said Model Preambles will be entertained -----				
Carried Forward						-

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						-
1	SANS 1200 A PSA 8.3.1	GENERAL				
1.1		Scheduled fixed-charge and value-related items (incl OHS & EMP measures):				
1.1.1		Fixed preliminary and general charges				
		.01 Contractual requirements (excluding items scheduled below)	Sum	1.00		
1.2	B8.3.2.1	Facilities for the Engineer:				
1.2.1	B8.3.2.1a)	.01 Engineers Offices	Sum	1.00		
1.2.2	8.3.3	.02 Safety equipment, incl hard hat, removable revolving orange light for vehicle, safety shoes & reflective vest	Sum	1.00		
1.2.3	B8.3.2.1b)	.03 Provision for the Engineer's Telephone	Sum	-		
1.2.4	B8.3.2.1c)	.04 Project name board	Sum	1.00		
1.3	8.3.2.2	Facilities for the Contractor:				
1.3.1	8.3.2.2.a	.01 Offices for the Contractor fully furnished	Sum	1.00		
1.3.2	8.3.2.2.b	.02 Workshops & laboratories	Sum	1.00		
1.3.3	8.3.3	.03 Living accommodation for the Engineer	Sum	-		
1.3.4	8.3.2.2.e	.04 Ablution and latrine facilities	Sum	1.00		
1.3.5	8.3.2.2.f	.05 Tools and equipment	Sum	1.00		
1.3.6	8.3.2.2.g	.06 Services to site offices (water supplies, electric power and communications)	Sum	1.00		
1.4	PSA5.7	Refer to particular specification Annex C5.3ZF: HEALTH AND SAFETY SPECIFICATIONS for requirements.				
1.4.1		.07 Compilation of Health & Safety Plan (to be approved by	Sum	1.00		
1.5	PSA8.3.2	Value-related preliminary and general charges	Sum	1.00		
1.6	PSA8.4.1	Time-related preliminary and general charges				
1.6.1		.01 Contractual requirements (excluding items scheduled below)	mnths	18.00		
1.7	B8.4.2.1	Facilities for the Engineer:				
1.7.1	B8.4.2.1a)	.01 Engineers Offices	mnths	-		
1.7.2	B8.4.2.1b)	.02 Provision for the Engineer's Telephone	mnths	18.00		
1.7.3	B8.4.2.1c)	.03 Project name board	mnths	18.00		
1.7.4	B8.4.2.1d)	.04 Survey Assistants and material	mnths	18.00		
1.7.5	B8.4.2.1d)	.04 Registered Surveyor	Day	10.00		
1.8	8.4.2.2	Facilities for the Contractor:				
1.8.1	8.4.2.2.d	.01 Living accommodation for the Engineer	mnths	-		
1.8.2	8.4.2.2.e	.02 Ablution and latrine facilities	mnths	18.00		
1.8.3	8.4.2.2.f	.03 Tools and equipment	mnths	18.00		
1.8.4	8.4.2.2.g	.04 Services to site offices (water supplies, electric power and communications)	mnths	18.00		
1.8.5	8.4.5	.05 Implement Health & Safety Plan	mnths	18.00		
1.8.6	8.4.5	.06 Implement Environmental Management Plan	mnths	18.00		
Carried Forward						

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R	C
Brought forward							
1.9	8.4.5	Accommodation of traffic	mnths	18.00			
1.10	8.5a	Sums stated provisionally by the Engineer:					
1.10.1		.01 Payment to the Surveyor for the setting 3 additional benchmarks	Prov Sum	1.00	R 10,000.00	R	10,000.00
1.10.2		.02 Overheads, charges and profit on item 03.01 above	%	10,000.00			
1.10.5		.03 Provision for salary of CLO	Prov Sum	18.00	R 4,500.00	R	81,000.00
1.10.6		.04 Overheads, charges and profit on item 03 above	%	81,000.00			
1.10.5		.05 Provision for skills training	Prov Sum	1.00	R 300,000.00	R	300,000.00
1.10.6		.06 Overheads, charges and profit on item 05 above	%	300,000.00			
1.10.3	8.5b	.01 Provision for salary of PSC, 140/seating) representatives compensation	Prov Sum	18.00	R 3,360.00	R	60,480.00
1.10.6		.02 Overheads, charges and profit on item 8.5b above	%	60,480.00			
1.10.4	8.5b	.03 Provision for salary of 3 Students (R4500pm ea) under training	Prov Sum	1.00	R 243,000.00	R	243,000.00
1.10.6		.04 Overheads, charges and profit on item 8.5b above	%	243,000.00			
1.11.1	8.5b	.01 On-site inspectorate and Additional tests required by Engineer	Prov Sum	1.00	R 100,000.00	R	100,000.00
1.11.2		.02 Charge required by Contractor on sub-items under 8.5b above	%	100,000.00			
1.11.3	8.5b	.03 Reimbursement for Employer Geotechnical, Occupational Health and Safety and EMP inspectorate Specialists	Prov Sum	-			
		.04 Charge required by Contractor on subitem 8.5b above	%	-			
1.11.4	8.5b	.05 Reimbursement for Employer internship staff on site	Prov Sum	-			
1.11.5		.06 Charge required by Contractor on subitem 8.5b above	%	-			
1.11.6	8.5b	.07 Application and submission of all wayleaves	Prov Sum	1.00	R 10,000.00	R	10,000.00
1.11.7		.08 Charge required by Contractor on subitem 8.5b above	%	10,000.00			
1.11.8	8.5b	.09 Provision for all actions, equipment and material required to connect with Existing pipeline	Prov Sum	1.00	R 50,000.00	R	50,000.00
1.11.9		.06 Overheads, charges and profit on item 8.5b above	%	50,000.00			
1.12	8.8.4	Location and protection of existing services:					
	8.8.4b	.01 Provision of detecting devices for:					
1.12.1		.01Electrical and other cables	Sum	1.00			
1.12.2		.02Water pipelines	Sum	1.00			
	8.8.4c	.02 Hand excavation necessary for locating and exposing existing services in all materials:					
1.12.3		.01 In roadways	m³	100.00			
1.12.4		.02 In all other areas	m³	200.00			
1.12.5	8.8.4a	.03 Appointment of a specialist for the detection and identification of all underground services.	Prov. Sum	-			
1.12.6		.06 Overheads, charges and profit on item 4.9 above	%	-			
SECTION B: SPECIFIC PRELIMINARIES							
1.13		ELECTRICAL WORKS SPECIFIC PRELIMINARIES					
1.13.1		Allow for testing and compliance certificate of the entire electrical installation.	Sum	1.00			
Carried Forward							

CLIENT:
TENDER NO.

CITY OF POLOKWANE
PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
1.13.2		Allow for As Built Drawings - 3 hard copies and schematic	Sum	1.00		
1.13.3		Allow for Site Establishment & Travel	Sum	1.00		
1.13.4		Allow for interface with other contractors	Sum	1.00		
1.13.5		Re-route Existing Electrical Cables	Sum	1.00		
1.13.6		Co-Ordination & Attendance Fee	Sum	1.00		
1.13.7		Engrave Labeling of DBs, Switch Covers & Kiosks	Sum	1.00		
1.13.9		Co-Ordination & Attendance Fee	Sum	1.00		
1.13.10		Application for Telkom Lines	Sum	1.00		
1.13.11		Co-Ordination & Attendance Fee	Sum	1.00		
PRELIMINARIES AND GENERAL CARRIED FORWARD TO SECTION 1 OF MAIN SUMMARY (ITEM 1.1)						

SECTION 2 - BUILDING AND STRUCTURAL WORKS (Incorporating Preambles and Excluding Preliminaries and Generals)

PREAMBLES FOR TRADES

Bidders are to note that the below applies in this Section 2:

The Model Preambles for Trades 2008 as published by the Association of South African Quantity Surveyors shall be deemed to be incorporated in these bills of quantities and no claims arising from brevity of description of items fully described in the said Model Preambles will be entertained

Supplementary preambles and/or specifications are incorporated in these bills of quantities to satisfy the requirements of this project. Such supplementary preambles and/or specifications shall take precedence over the provisions of the Model Preambles

The contractor's prices for all items throughout the Section 2 bills of quantities shall take account of and include for all of the obligations, requirements and specifications given in the Model Preambles and in any supplementary preambles and/or specifications

BILLS OF QUANTITIES SECTION 2 : FOUNDATIONS (PROVISIONAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.2				
		BILL NO. 1				
2.1		FOUNDATIONS (EARTHWORKS, PROVISIONAL)				
		NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors				
		Note: All excavation depths have been calculated from predetermined platform levels performed under a separate contract. -----				
		SUPPLEMENTARY PREAMBLES				
		Nature of ground				
		Descriptions of excavations shall be deemed to include all ground conditions classifiable as "earth" and where conditions of a more difficult character are indicated these are separately measured				
		EXCAVATION, FILLING, ETC OTHER THAN BULK				
		Site clearance				
		Digging up and removing rubbish, debris, vegetation, hedges, shrubs and trees not exceeding 200mm girth, bush, etc	m2	-		
		Excavate in compacted pickable material as defined not exceeding 2 m deep below reduced or filled up ground level, part return, fill in and ram and remainder deposit on site where directed.				
2.1.1		To reduce levels to final levels under floors	m3	405.00		
2.1.2		Excavate for surface trenches and ground beams.	m3	-		
		Sundries				
2.1.3		Extra over all excavations in compacted pickable material for excavation in soft rock as described. 10% of excavation in earth in trenches allowed for in Soft Rock	m3	-		
2.1.4		Extra over all excavations in compacted pickable material for excavation in hard rock as described. 5% of excavation in earth in trenches allowed for in Hard Rock	m3	-		
2.1.5		Extra over all excavations for carting away excavated material as described (Contractor to allow for bulking).	m3	405.00		
2.1.6		Allow for the risk of collapse to sides of excavation from ground level not exceeding 1,5 m deep.	m2	-		
2.1.7		Allow for keeping excavations free of water and mud by pumping or bailing.	Item	-		
		FILLING, ETC:				
2.1.8		Backfill to trenches using excavated material on site, saturated to optimum moisture content and compacted to 93% modified AASHTO into trenches, including haulage not exceeding 100m from the perimeter of the excavation.	m3	-		
2.1.9		Imported from commercial sources G5 filling, supplied and carted onto the site by the Contractor, compacted to 98% modified AASHTO under solid floors overall up to 150mm layer.	m3	405.00		
		Compaction of surfaces				
2.1.10		Compaction of ground surface under floors, etc, including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 93% Mod AASHTO density	m2	2,700.00		
Carried Forward						

CLIENT:

CITY OF POLOKWANE

TENDER NO.

PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

BILLS OF QUANTITIES SECTION 2 : FOUNDATIONS (PROVISIONAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
2.1.11		Test Allow for the provision of density tests to be carried out by the Contractor and pay all charges in connection therewith.	no	60.00		
		SOIL POISONING				
		Soil insecticide				
2.1.12		To bottoms and sides of trenches, holes, etc	m2	-		
2.1.13		Under floors,etc, including forming and poisoning shallow furrows against foundation walls, etc, filling in furrows and ramming	m2	2,700.00		
FOUNDATIONS CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.1)						

BILLS OF QUANTITIES SECTION 2 : PILING (PROVISIONAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.2		SECTION NO.2				
		BILL NO. 2				
		PILING (PROVISIONAL)				
		SUPPLEMENTARY PREAMBLES				
		Indemnity				
		The contractor shall take full responsibility for piling work and shall guarantee that piling work will support the calculated loads laid down by the engineer without injurious settlement. The actual lengths of piles shall be determined on site by the contractor in consultation with the engineer who will give all assistance possible. This does not in any way relieve the contractor of his responsibility or obligation to provide the specified guarantee				
		The contractor shall indemnify the employer against any injury to or death of any person and all loss or damage to all structures resulting from the failure of any pile. In the event of the failure of a pile the contractor shall make good such pile and all consequent damage at his own expense				
		The contractor shall insure by means of a policy, approved by the principal agent, against risks arising out of the responsibilities, guarantee and indemnities specified. The contractor shall pay all premiums in respect of this insurance policy. The guarantee shall be for the amount and effective period as stated hereafter in this bill				
		Drilling				
		Classification of material				
2.2.1		Hard rock shall mean granite, quartzitic sandstone or other rock of similar hardness, the removal of which would normally require drilling, wedging and splitting or the use of explosives "Earth" shall mean all ground other than that classified as "hard rock" and shall include made-up ground and loose stones or pieces of concrete not exceeding 0,03m ³ in volume as well as hard material the removal of which would normally warrant the use of pneumatic tools and which includes hard shale, ferricite, compact outcrop and material of similar hardness				
		GUARANTEE AND INSURANCE				
		Insurance policy against claims arising from the installation of piling up to a limit of R 5 00 000 per claim with no limit on the number of claims that may occur and effective for a period of 5 years from the date of completion of the contract	Item	-		
		ESTABLISHMENT				
		Transporting to site of necessary plant for the execution of the work and removal thereof on completion	Item	-		
		Allowance for testing	Item	-		
		SETTING UP				
		Setting up and establishment and re-establishment of plant and equipment for piles in different positions on site	No	-		
		AUGERED PILES				
		Drilling not exceeding 10m deep in earth below natural ground level				
2.2.5		450mm Diameter pile shafts (average resistance level 8m deep)	m	-		
2.2.6		Extra over drilling 450mm diameter pile shaft for under-reaming enlarged foot 600mm diameter extreme and 600mm high (Bulbous point)	No	-		
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : PILING (PROVISIONAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
2.2.7		Drilling in strata of a more difficult character Extra over drilling and under-reaming in earth for drilling in hard rock, allowance of 10% of total pile strata	m3	-		
2.2.8		Extra over drilling for carting away Surplus material from pile shafts etc to a dumping site to be located by the contractor	m3	-		
2.2.9		30MPa/19mm reinforced concrete 450mm Diameter piles	m3	-		
2.2.10		0.8 x 0.8m x 0.5m deep Pile caps	m3	-		
		Type 1: Stub columns 600 x 500 mm Columns	m3	-		
		Type 2: Stub columns 500 x 280 mm Columns	m3	-		
2.2.12		High tensile steel reinforcement to structural concrete work 16mm Diameter bars in lengths not exceeding 13m	t	-		
2.2.13		Various Diameter bars in lengths not exceeding 13m in Pile Caps and Stub Columns	t	-		
2.2.14		Mild tensile steel reinforcement in stirups to structural steel rebar				
2.2.15		Various Diameter bars in Stirrups	t	-		
PILING CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.2)						

BILLS OF QUANTITIES SECTION 2 : CONCRETE, FORMWORK AND REINFORCEMENT

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.2				
		BILL NO. 3				
2.3		CONCRETE, FORMWORK AND REINFORCEMENT, ETC				
		NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors. Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site				
		SUPPLEMENTARY PREAMBLES				
		Cost of tests The costs of making, storing and testing of concrete test cubes as required under clause 7 "Tests" of SABS 1200 G shall include the cost of providing cube moulds necessary for the Engineer. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the Engineer (Test cubes are measured separately)				
		Formwork Descriptions of formwork shall be deemed to include use waste only (except where described as "left in" or "permanent"), for fitting together in the required forms, wedging, plumbing, and fixing to true angles and surfaces as necessary to ensure easy release during stripping and for reconditioning as necessary before re-use. The vertical strutting shall be carried down to such construction as is sufficiently strong to afford the required support without damage and shall remain in position until the newly constructed work is able to support itself.				
		REINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES				
		20MPA / 19mm stone concrete				
2.3.1		Surface beds	m3	405.00		
		REINFORCED CONCRETE ON/IN FORMWORK				
		30MPA / 19mm stone concrete (Labour only with material from client free issue)				
2.3.2		Columns	m3	14.00		
2.3.3		Slabs	m3	193.88		
2.3.4		Stepped Slabs (Seating terrace Second Floor and VIP Floor)	m3	678.59		
2.3.5		Beams	m3	101.35		
2.3.6		Sloping Beams	m3	105.25		
2.3.7		Staircases	m3	70.16		
2.3.8		Lift shaft wall	m3	8.16		
		30MPA / 19mm stone concrete				
2.3.9		Columns	m3	21.00		
2.3.10		Slabs	m3	38.78		
2.3.11		Stepped Slabs (Seating terrace Second Floor and VIP Floor)	m3	135.72		
2.3.12		Beams	m3	20.27		
2.3.13		Sloping Beams	m3	21.05		
2.3.14		Staircases	m3	14.03		
		TEST CUBES				
2.3.15		Making and testing 150 x 150 x 150mm concrete strength test cube (Provisional)	No	550.00		
		CONCRETE SUNDRIES				
		Finishing top surfaces of concrete smooth with a power float				
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : CONCRETE, FORMWORK AND REINFORCEMENT

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
2.3.16		Slabs, Surface beds etc SMOOTH FORMWORK (DEGREE OF ACCURACY II) Smooth formwork to sides	m2	1,762.50		
2.3.17		Rectangular columns propping exceeding 3.5 and not exceeding 5m	m2	25.00		
2.3.18		Rectangular columns propping exceeding 1.5 and not exceeding 3.5m	m2	16.08		
2.3.19		Sloping Sides and soffits of beams propping exceeding 5m and not exceeding 7.5m	m2	10.00		
2.3.20		Sloping Sides and soffits of beams propping exceeding 3.5m and not exceeding 5m	m2	2,021.30		
2.3.21		Sloping Sides and soffits of beams propping exceeding 1.5m and not exceeding 3.5m	m2	264.00		
2.3.22		Sloping soffits of steps propping exceeding 1.5m and not exceeding 3.5m	m2	249.60		
2.3.23		Sides and soffits of beams propping exceeding 3.5m and not exceeding 5m	m2	10.00		
2.3.24		Sides and soffits of beams propping exceeding 1.5m and not exceeding 3.5m	m2	685.62		
2.3.25		Slabs exceeding 250mm and not exceeding 500mm, propping exceeding 3.5m and not exceeding 5 m	m2	1,136.30		
2.3.26		Slabs not exceeding 250mm, propping exceeding 10m and not exceeding 15 m	m2	20.25		
2.3.27		Sides of slabs exceeding 250mm and not exceeding 250mm, propping exceeding 3.5m and not exceeding 5m	m2	180.00		
2.3.28		Racking sides of steps exceeding 250mm and not exceeding 250mm, propping exceeding 3.5m and not exceeding 5m	m2	31.20		
2.3.29		Internal sides (innerface of lift shaft) of walls propping exceeding 10m and not exceeding 15m	m2	63.00		
2.3.30		External sides (outerface of lift shaft) of walls propping exceeding 1.5m and not exceeding 3.5m	m2	63.00		
2.3.31		20 x 20mm chamfers to edges of beams, columns and steeped slabs MOVEMENT JOINTS ETC Isolation joints with polyurethane between vertical concrete slabs/or brick surfaces filled with 15mm compressible filler with tear off strip	m	596.25		
2.3.32		10mm Joints not exceeding 300mm high Expansion joint	m	1,606.50		
2.3.33		20mm Joints not exceeding 300mm high Saw-cut joints	m	810.00		
2.3.34		6 x 42.5mm Saw-cut joints in top of concrete REINFORCEMENT (PROVISIONAL) High and Mild tensile steel reinforcement to structural concrete work	m	1,620.00		
2.3.35		Various diameter bars High and Mild tensile steel reinforcement to structural concrete work steel fixing only (Client free issue - reinforcement bars on site)	t	146.00		
2.3.36		Various diameter bars	t	23.00		
2.3.37		Fabric reinforcement				
2.3.38		Type ref. 245 mesh fabric reinforcement in concrete surface beds, slabs, etc.	m2	2,700.00		
CONCRETE, FORMWORK AND REINFORCEMENT CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.3)						

BILLS OF QUANTITIES SECTION 2 : MASONRY

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.4		SECTION NO.2 BILL NO. 4 MASONRY NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors SUPPLEMENTARY PREAMBLES BRICKWORK Sizes in descriptions Where sizes in descriptions are given in brick units, "one brick" shall represent the length and "half brick" the width of a brick Face bricks Bricks shall be ordered timeously to obtain uniformity in size and colour FOUNDATIONS (PROVISIONAL) Brickwork of NFX bricks (14 MPa nominal compressive strength) in class 1 mortar				
2.4.1		Half brick walls	m2	50.00		
2.4.2		One brick walls	m2	110.00		
		SUPERSTRUCTURES				
		Superstructure Brickwork of NFX bricks in class II mortar				
2.4.3		Half brick walls	m2	50.00		
2.4.4		One brick walls	m2	100.00		
2.4.5		Half brick walls (Labour only, bricks to be client free issue)	m2	986.80		
2.4.6		One brick walls (Labour only, bricks to be client free issue)	m2	6,702.00		
		BRICKWORK SUNDRIES				
		Brickwork reinforcement				
2.4.5		150mm Wide reinforcement built in horizontally	m	16,543.80		
2.4.6		75mm Wide reinforcement built in horizontally	m	11,247.39		
		FACE BRICKWORK				
		Approved FBS face bricks (PC Sum of R 6500.00/1000 delivered to site) built in stretcher bond and pointed with square recessed horizontal and vertical joints, including fair cutting , angles, etc.				
2.4.7		Extra over brickwork for face brickwork	m2	300.00		
		Approved FBS face bricks (delivered to site) built in stretcher bond and pointed with square recessed horizontal and vertical joints, including fair cutting , angles, etc. (Client Free Issue)				
2.4.8		Extra over brickwork for face brickwork (Labour Only)	m2	3,367.73		
2.4.9		Extra over brickwork for face brickwork in foundation walls, ramp, etc (Labour only)	m2	235.00		
		"Fabcon" or other similar approved prestressed prefabricated lintels				
2.4.10		110 x 75mm lintels in lengths not exceeding 3m	m	8.16		
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : MASONRY

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought Forward						
2.4.11		230 x 75mm lintels in lengths not exceeding 3m	m	216.80		
2.4.12		230 x 75mm lintels in lengths exceeding 3m and not exceeding 4.5m	m	65.37		
2.4.13		230 x 75mm lintels in lengths exceeding 4.5m and not exceeding 6m	m	29.94		
2.4.14		230 x 75mm lintels in lengths exceeding 9m and not exceeding 10.5m	m	19.36		
		Turning pieces				
2.4.15		115mm wide turning pieces to lintels etc	m	8.16		
2.4.16		220mm wide turning pieces to lintels etc	m	331.47		
		Brick on edge header course, copings, cills etc of facebrick at a PC SUM R6500/1000 delivered to site, pointed with polished recessed joints on all exposed faces				
2.4.17		Brick on edge header course lintel	m	271.66		
		Brick on edge soldier course, copings, cills etc of facebrick at a PC SUM R6500/1000 delivered to site, pointed with polished recessed joints on all exposed faces				
2.4.18		Brick on edge to cills, slightly sloping	m	271.66		
		Fair cutting to facebrick				
2.4.19		Fair raking cutting to facebrick	m	360.00		
MASONRY CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.4)						

BILLS OF QUANTITIES SECTION 2 : WATERPROOFING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.5		SECTION NO.2 BILL NO. 5 WATERPROOFING NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors. Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site SUPPLEMENTARY PREAMBLES Waterproofing of roofs, basements, etc shall be laid under a ten year guarantee. Waterproofing to roofs shall be laid to even falls to outlets etc with necessary ridges, hips and valleys. Descriptions of sheet or membrane waterproofing shall be deemed to include additional labour to turn-ups and turn-downs DAMPPROOFING OF WALLS AND FLOORS One layer 375 micron embossed polyethylene dampproof course (SANS 952-1985 type B)				
2.5.1		In walls	m2	247.00		
2.5.2		One layer 250 micron green polyethylene waterproof sheeting (SANS 952-1985 type C) sealed at laps with PVC self-adhesive tape Under surface beds WATERPROOFING TO ROOFS ETC One layer 4mm special polyester fully bonded waterproof membrane comprising a matrix modified with polypropylene dual reinforced with non-woven polyester cloth and glass fibre tissue, laid with 75mm side and 100mm end laps	m2	2,700.00		
2.5.3		On concrete roofs	m2	812.00		
2.5.4		JOINT SEALANTS, ETC Two- part grey polysulphide sealing compound including backing cord, bond breaker, primer, etc 10 x 15mm In isolation joints in floors including raking out joint filler as necessary	m	1,606.50		
2.5.5		20 x 15mm In expansion joints in floors including raking out joint filler as necessary	m	810.00		
2.5.6		6mm in saw cut joints in floors	m	1,620.00		
WATERPROOFING CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.5)						

BILLS OF QUANTITIES SECTION 2 : ROOF COVERING, CLADDING ETC

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.6		SECTION NO.2 BILL NO. 6 ROOF COVERINGS AND CLADDINGS NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors. Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site PROFILED METAL SHEETING AND ACCESSORIES Diamondek Springlock 700 premium concealed fix roofing system, including galvanised steel clips fixed to steel purlins				
2.6.1		Roof covering with pitches not exceeding 25 degrees	m2	4,037.00		
ROOF COVERING, CLADDING ETC CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.6)						

BILLS OF QUANTITIES SECTION 2 : CARPENTRY AND JOINERY

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.7		SECTION NO.2 BILL NO. 7 CARPENTRY AND JOINERY NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site SUPPLEMENTARY PREAMBLES Particle board Particle board shall comply with the following specifications: a) SABS 1300 Particle board: exterior and flooring type b) SABS 1301 Particle board: interior type Descriptions The term "planted on" shall mean the nailing of timber to timber The term "screwed on" shall mean the countersunk screwing of timber to timber The term "screwed and pelleted on" shall mean the screwing of timber to timber with the heads of screws sunk and pelleted The term "plugged" shall mean the countersunk screwing of timber to brickwork or concrete including plastic plugs The term "plugged and pelleted" shall mean the screwing of timber to brickwork or concrete including plugs with heads of screws sunk and pelleted Joinery Descriptions of frames shall be deemed to include frames, transomes, mullions, rails, etc Descriptions of hardwood joinery shall be deemed to include pelleting of bolt holes Fixing Items described as "nailed" shall be deemed to be fixed with hardened steel nails or shot pins to brickwork or concrete. Items described as "plugged" shall be deemed to include screwing to fibre, plastic or metal plugs at not exceeding 600mm centres, and where described as "bolted" the bolts have been given elsewhere. Decorative laminate finish Laminate finish shall be glued under pressure. Edge strips shall be butt jointed at junctions with adjacent similar finish The sizes listed are Nominal sizes for solid SA pine members DOORS, ETC Biticon Industries Class B or similar fire doors with 2 hour fire rating, steel frame elsewhere				
2.7.1		Rubidor class B fire door size 900 x 2125mm high	No	9.00		
2.7.2		Rubidor class B fire double door overall size 1800 x 2125mm high	No	8.00		
2.7.3		Rubidor class B fire double door overall size 1800 x 2125mm high, including panic bars	No	9.00		
2.7.4		Solid chipcore flush doors with commercial veneer suitable for painting, painting elsewhere, hung to steel frames 40mm thick Door 900mm x 2125mm high	No	26.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : CARPENTRY AND JOINERY

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
2.7.5		40mm thick Double Door overall size 1800mm x 2125mm high	No	12.00		
2.7.6		40mm thick Double Door overall size 1800mm x 2125mm high, including panic bars Semi-solid flush panel door finished both sides with masonite veneer suitable for painting, painting elsewhere including hardwood edge strips to vertical edges and hung to steel frames	No	1.00		
2.7.7		40mm thick Door 900mm x 2125mm high	No	49.00		
2.7.8		Purpose made 40mm thick Door 1000mm x 2125mm high SKIRTINGS Wrought meranti	No	6.00		
2.7.9		19 x 75mm Skirtings including 20mm quadrant bead, nailed	m	404.00		
CARPENTRY AND JOINERY CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.7)						

BILLS OF QUANTITIES SECTION 2 : CEILINGS, PARTITIONS AND ACCESS FLOORING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.2				
		BILL NO. 8				
2.8		CEILINGS, PARTITIONS AND ACCESS FLOORING				
		NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors				
		CEILING TIMBERS, BEADS, INSULATION, ETC				
		Non-combustible fibreglass insulation of a density of not less than 10kg/m3 bonded with an inert thermo-setting resin				
		40mm Insulation in blanket form closely fitted and laid on top of branderling between roof timbers etc	m2	420.00		
		SUSPENDED CEILINGS				
		Suspended "GYPROC" ceiling with "GYPREX" lay-in tiles including a standard faced exposed grid suspension system including main and cross tees, necessary hangers, grids, etc supplied by manufacturer				
2.8.1		Ceilings suspended not exceeding 1m below concrete slabs	m2	420.00		
		NAILED-UP CEILINGS				
		6.4mm GYPROC Rhinoboard bulk head ceiling with 3mm Rhinolite finish and painted (elsewhere)				
2.8.2		Vertical portion of bulkhead not exceeding 300mm high including standard steel branderling at 900mm centres, joined with joiner sections and hung with suspension brackets including supporting framework	m	152.25		
2.8.3		Horizontal portion of bulkhead not exceeding 1200mm wide including standard steel branderling at 900mm centres, joined with joiner sections and hung with suspension brackets including supporting framework	m	152.25		
2.8.4		Opening for sprinkler head in horizontal portion of bulkheads	No	50.00		
2.8.5		Opening for downlighter in horizontal portion of bulkhead	No	60.00		
		Cornices				
2.8.6		40 x 34mm Steel MARLEY shadowline wall angle.	m	194.00		
2.8.7		Hidden accurate joint between soffit and wall.	m	528.85		
		PARTITIONS				
		Rhinowall Drywall partition system:				
		Rhinowall Standard System steel stud partitions with both sides clad with one layer of 12mm "Taper-edge Rhinoboard":				
2.8.8		Partitions 90mm thick and 2915mm high with bottom and top tracks plugged	m	180.00		
2.8.9		Extra over partition 2915mm high for vertical abutment	No	68.00		
2.8.10		Extra over partition 2915mm high for T-intersection	No	42.00		
2.8.11		Extra over partition 2915mm high for fair end	No	58.00		
2.8.12		Extra over 90mm drywall partitions for doors 900 x 2650mm high	No	56.00		
CEILINGS, PARTITIONS ACCESS FLOORING CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.8)						

BILLS OF QUANTITIES SECTION 2 : FLOOR COVERINGS, PLASTIC LININGS, ETC

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.9		SECTION NO.2 BILL NO. 9 FLOOR COVERINGS, PLASTIC LININGS, ETC. NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors CARPET TILES 600 x 600mm Carpet tiles (PC sum R450/m2) including fixing to screeded floor to Architects approval				
2.9.1		On floors	m2	765.00		
FLOOR COVERINGS, PLASTIC LININGS ETC CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.9)						

BILLS OF QUANTITIES SECTION 2 : IRONMONGERY

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.10		SECTION NO.2 BILL NO. 10 IRONMONGERY NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors. Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site Proprietary items Where applicable the manufacturers' names or product catalogue titles are given in sub-headings preceding the items. Prices are to be based on the specific products/articles specified. If tenderers wish to offer alternative products/articles for certain items, these items are to be clearly marked and the alternative specification given with supporting brochures etc clarifying the features of the products/articles offered. On request returnable samples are to be provided to the principal agent for consideration HINGES, BOLTS, ETC DORMA DBS-SS-009 Aluminium standard butt hinge size 102 x 75 x 3mm LOCKS DORMA The following locks are in one set with a master key: DIB-SS026 Stainless steel indicator bolt BUDGETARY ALLOWNANCE Allow the sum of R200 000 for door locks to timber doors, aluminium door and window locks including installation, specification to approved by Architect Allow for profit if required				
2.10.1		DBS-SS-009 Aluminium standard butt hinge size 102 x 75 x 3mm	No	22.00		
2.10.2		DIB-SS026 Stainless steel indicator bolt	No	22.00		
2.10.3		Allow the sum of R200 000 for door locks to timber doors, aluminium door and window locks including installation, specification to approved by Architect	Prov Sum	1.00	R 200,000.00	R 200,000.00
2.10.3.1		Allow for profit if required	%	200,000.00		
IRONMONGERY CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.10)						

BILLS OF QUANTITIES SECTION 2 : STRUCTURAL STEELWORK

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.11		SECTION NO.2 BILL NO. 11 STRUCTURAL STEELWORK NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors SUPPLEMENTARY PREAMBLES Descriptions Descriptions of bolts shall be deemed to include nuts and washers Descriptions of L-shaped and U-shaped anchor bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete THE FOLLOWING IN PROVIONAL STEEL ROOF STRUCTURE Trusses, Purlins, Sag-Bars, Girders, Fafter Beams and Bracings				
2.11.1		Various Components STEEL GUTTERS AND RAINWATER PIPES GALVANISED STEEL GUTTERS AND RAINWATER PIPES 3mm Welded plate rainwater pipes, including holderbats, brackets, etc	t	75.78		
2.11.2		110mm Internal diameter pipes TESTS Weld testing	t	7.45		
2.11.3		X-Ray test of 10mm long butt weld joint to 10mm thick web plate	No	248.00		
2.11.4		Allow for sundries	t	2.91		
STRUCTURAL STEELWORK CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.11)						

BILLS OF QUANTITIES SECTION 2 : METALWORK

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	BID AMOUNT R C
		SECTION NO.2				
		BILL NO. 12				
2.12		METALWORK				
		NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors				
		SUPPLEMENTARY PREAMBLES				
		Descriptions				
		Descriptions of bolts shall be deemed to include nuts and washers				
		Descriptions of L-shaped and U-shaped anchor bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete				
		Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete				
		Descriptions of L-shaped and U-shaped anchor bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete. Where anchor bolts are described as embedded in sides or soffits of concrete it shall be deemed to include holes through formwork.				
		Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete.				
		STEEL BALUSTRADING, HANDRAILS				
2.12.1		Welded horizontal balustrading to walkways of flat section continuous top and bottom rails with vertical hollow section standards framed through bottom rail and filled in between top and bottom rails with vertical hollow section balusters	m	442.00		
2.12.2		Continuous pipe handrail with brackets at not exceeding 2400mm centres of bent round bar, welded to handrail and provided with flange plates holed for and bolted to brickwork or concrete including bolts	m	862.50		
2.12.2b		Raking continuous pipe handrail with brackets at not exceeding 2400mm centres of bent round bar, welded to handrail and provided with flange plates holed for and bolted to brickwork or concrete including bolts	m	333.50		
		STEEL GATES, SCREENS, ETC				
		Mild steel screens and gates ,etc (Painting elsewhere)				
2.12.3		Single gate 2800 x 2100mm high including mild steel frame, type G06	No	1.00		
2.12.4		Single gate 1000 x 2125mm high including mild steel frame, type G05	No	5.00		
2.12.5		Double gate 3150 x 1210mm high including mild steel subframes, type G04	No	1.00		
2.12.6		Double gate 3000 x 2100mm high including mild steel subframes, type G03	No	1.00		
2.12.7		Double gate 3150 x 2100mm high including mild steel subframes, type G02	No	3.00		
2.12.8		Double gate 4719 x 2100mm high including mild steel subframes, type G01	No	1.00		
		PRESSED STEEL DOOR FRAMES				
		GALVANIZED PRESSED STEEL DOOR FRAMES				
2.12.9		1,2mm Double Rebated frames suitable for half brick walls				
		Frame for door 900 x 2125 mm high	No	1.00		
		1,2mm Double Rebated frames suitable for One brick walls				
2.12.10		Frame for door 900 x 2125mm high, for single door type D21, D18, D16, D14, D13, D04, D03	No	86.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : METALWORK

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	BID AMOUNT R C
Brought forward						
2.12.11		Frame for door 900 x 2125mm high, for single door type D15	No	1.00		
2.12.12		Frame for door 1600 x 2125mm high, for double door type D20	No	3.00		
		Frame for door 1800 x 2125mm high, for double door type D19, D09, D12	No	10.00		
2.12.14		Frame for door 2000 x 2125mm high, for double door type D10, D11	No	7.00		
		STEEL ROLLER SHUTTERS ETC				
		Galvanised steel roller shutters with 76mm slats (18kg/m ²), fixed to brickwork or concrete				
2.12.15		Chain operated slatted roller shutter for 5080 x 1535mm high opening D27	No	1.00		
2.12.16		Chain operated slatted roller shutter for 3730 x 1535mm high opening, type D28	No	1.00		
		PRESSED STEEL COMBINATION DOORS AND FRAMES				
2.12.17		Mild steel double door 1800 x 2125mm high with rebated frame suitable for one brickwall, type D12	No	2.00		
		ALUMINIUM WINDOWS, DOORS, ETC				
		ALUMINIUM WINDOWS				
		Refer to attached Aluminium Door and Window schedules for details of doors and windows drawing no. " Door and Window Schedule_Rev00 " all to Architects approval and to comply with SANS 10400 Part N (Note: Glass and Ironmongery Elsewhere)				
2.12.18		Purpose made Window extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Window schedule type W01 fixed to brickwall opening, overall size <u>500 x 4320mm high</u>	No	3.00		
2.12.19		Purpose made Window extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Window schedule type W02 fixed to brickwall opening, overall size <u>1500 x 1500mm high</u>	No	1.00		
2.12.20		Purpose made Window extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Window schedule type W03 fixed to brickwall opening, overall size <u>3589 x 1600mm high</u>	No	2.00		
2.12.21		Purpose made Window extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Window schedule type W04 fixed to brickwall opening, overall size <u>500 x 2700mm high</u>	No	4.00		
		ALUMINIUM LOUVERS				
2.12.22		Purpose made Louvers extruded aluminium frame, subframes and louver panels, <u>powder coated (Matt Black)</u> to be fixed in, as per Door and Window schedule type W04 fixed to brickwall or concrete opening, overall size <u>5930 x 4278mm high</u>	No	2.00		
2.12.23		Purpose made Louvers extruded aluminium frame, subframes and louver panels, <u>powder coated (Matt Black)</u> to be fixed in, as per Door and Window schedule type W06 fixed to brickwall or concrete opening, overall size <u>3600 x 2180mm high</u>	No	1.00		
		ALUMINIUM DOORS				
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : METALWORK

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	BID AMOUNT R C
Brought forward						
		Refer to attached Aluminium Door and Window schedules for details of doors and windows drawing no. 'Door Schedule_Rev 00' in conjunction with 'Door and Window Schedule_Rev00' all to Architects approval and to comply with SANS 10400 Part N (Note: Glass and Ironmongery Elsewhere)				
2.12.24		Purpose made door Class B extruded aluminium frame with subframes, <u>powder coated</u> and fire rated for glass panels to be fixed in as per door schedule type D01 fixed to brickwall opening, overall size <u>1500 x 2700mm high</u>	No	6.00		
2.12.25		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D02 fixed to brickwall opening, overall size <u>1500 x 1200mm high</u>	No	3.00		
2.12.26		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D05 fixed to brickwall opening, overall size <u>3905 x 2635mm high</u>	No	2.00		
2.12.27		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D06 fixed to brickwall opening, overall size <u>2857 x 2635mm high</u>	No	2.00		
2.12.28		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D07 fixed to brickwall opening, overall size <u>2320 x 2635mm high</u>	No	1.00		
2.12.29		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D08 fixed to brickwall opening, overall size <u>2637 x 2635mm high</u>	No	1.00		
2.12.30		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D22 fixed to brickwall opening, overall size <u>4000 x 2635mm high</u>	No	2.00		
2.12.31		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D23 fixed to brickwall opening, overall size <u>2210 x 2635mm high</u>	No	2.00		
2.12.32		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D24 fixed to brickwall opening, overall size <u>3000 x 2635mm high</u>	No	6.00		
2.12.33		Purpose made door extruded aluminium frame with subframes plus a panic bar, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D25 fixed to brickwall opening, overall size <u>1800 x 2700mm high</u>	No	2.00		
2.12.34		Purpose made door extruded aluminium frame with subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type D26 fixed to brickwall opening, overall size <u>900 x 2700mm high</u>	No	2.00		
2.12.35		Purpose made door extruded aluminium frame with subframes with panic bar, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per door schedule type SF1 fixed to brickwall opening, overall size <u>2000 x 2975mm high</u>	No	1.00		
		CURTAIN WALLS, SHOPFRONTS ETC				
		ALUMINIUM SHOPFRONTS				
		Refer to attached Aluminium Door and Window schedules for details of doors and windows drawing no. 'Shopfront Schedule_Rev00' all to Architects approval and to comply with SANS 10400 Part N (Note: Glass and Ironmongery Elsewhere)				
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : METALWORK

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	BID AMOUNT R C
Brought forward						
2.12.36		Purpose made Shopfront extruded aluminium frame with 2000 x 2975mm double door subframe and other subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in, as per Shopfront schedule type SF01 fixed to brickwall or concrete opening, overall size <u>5346 x 4365mm high</u>	No	1.00		
2.12.37		Purpose made Shopfront extruded aluminium frame subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in, as per Shopfront schedule type SF02, SF03 fixed to brickwall or concrete opening, overall size <u>1449 x 4365mm high</u>	No	2.00		
2.12.38		Purpose made Shopfront extruded aluminium frame and subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Shopfront schedule type SF04 fixed to brickwall or concrete opening, overall size <u>5346 x 4365mm high</u>	No	1.00		
2.12.39		Purpose made Shopfront extruded aluminium frame and subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Shopfront schedule type SF11, SF12 fixed to brickwall or concrete opening, overall size <u>9108 x 2744mm high</u>	No	2.00		
2.12.40		Purpose made Shopfront extruded aluminium frame and subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Shopfront schedule type SF05, SF08 fixed to brickwall or concrete opening, overall size <u>9430 x 7500mm high</u>	No	2.00		
2.12.41		Purpose made Shopfront extruded aluminium frame and subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Shopfront schedule type SF06, SF07 fixed to brickwall or concrete opening, overall size <u>6547 x 7500mm high</u>	No	2.00		
2.12.42		Purpose made Shopfront extruded aluminium frame and subframes, <u>powder coated (Matt Black)</u> for glass panels to be fixed in as per Shopfront schedule type SF09, SF10 fixed to brickwall or concrete opening, overall size <u>3750 x 7055mm high</u>	No	1.00		
METALWORK CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.12)						

BILLS OF QUANTITIES SECTION 2 : PLASTERING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.13		SECTION NO.2 BILL NO. 13 PLASTERING NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors GRANOLITHIC SUPPLEMENTARY PREAMBLES Method The method to be used shall be either the monolithic method or the bonded method Preparation For granolithic applied monolithically, the concrete floor shall be swept clean after bleeding of the concrete has ceased and the slab has begun to stiffen; any remaining bleed water shall be removed and the granolithic applied immediately thereafter. For granolithic to be bonded to the floor slab after it has hardened, the slab surface shall be hacked (preferably by mechanical means) until all laitance, dirt, oil, etc is dislodged and swept clean of all loose matter. The slab shall then be wetted and kept damp for at least six hours before applying the granolithic Mix Granolithic shall attain a compressive strength of at least 41MPa. The coarse aggregate shall comply with SANS 1083 and shall generally be capable of passing a 10mm mesh sieve. Where the thickness of the granolithic exceeds 25mm, the size of the coarse aggregate shall be increased to the maximum size compatible with the thickness of the granolithic Panels Granolithic shall be laid in panels not exceeding 14m² for monolithic finishes, not exceeding 9,5m² for bonded finishes and not exceeding 6m² for all external granolithic. Wherever possible, panels shall be square but at no time should the length of the panel exceed 1,5 times its width Where possible joints between panels shall be positioned over joints in the floor slab and shall be at least 3mm wide through the full thickness of the finish, separated by strips of wood or fibreboard and finished with V-joints Laying Monolithic granolithic shall be applied to the partially set slab and thoroughly compacted and lightly wood floated to the required levels Bonded granolithic shall be applied to the slab after applying a 1:1 sand-and-cement slurry brushed over the surface and allowed to partially set before applying the granolithic. The granolithic shall be thoroughly compacted and lightly wood floated to the required levels After wood floating, the monolithic and bonded granolithic shall remain undisturbed until bleeding has ceased and the surface has stiffened. Any remaining bleed water and laitance shall then be removed and the surface steel trowelled or power floated Curing, seasoning and protection Granolithic shall be covered with clean hessian with waterproof building foil over and kept wet for at least seven days after laying Colour				
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : PLASTERING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
		Coloured granolithic shall be tinted with an approved colouring pigment mixed into the granolithic in the adequate proportion of pigment per pocket of cement, of uniform appearance and consistent colour throughout				
		Tinted granolithic on concrete (degree of accuracy grade III)				
2.13.1		30mm Thick on floors of mix 1:3	m2	2,880.00		
		SCREEDS				
		Screeds wood floated on concrete				
2.13.2		30mm Thick on floors and landings of mix 1:3	m2	444.36		
		INTERNAL PLASTER				
		Cement plaster on brickwork				
		On walls of mix 1:4	m2	5,740.00		
2.13.4		On walls in narrow widths	m2	195.29		
		Cement plaster on concrete				
2.13.5		On walls of mix 1:4	m2	158.00		
		EXTERNAL PLASTER				
		Cement plaster on brickwork				
2.13.6		On walls of mix 1:3	m2	477.00		
PLASTERING CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.13)						

BILLS OF QUANTITIES SECTION 2 : TILING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.14		SECTION NO.2 BILL NO. 14 TILING NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors SUPPLEMENTARY PREAMBLES Tiling on brick or concrete walls, columns, etc and floors to be fixed in strict accordance with the manufacturer's instructions and to include for adhesives, bedding and grouting complete to plastered or screeded surfaces (measured elsewhere) Patterns Unless otherwise described, tiles shall be laid with continuous joints in both directions Fixing Unless described as "fixed with adhesive to plaster (plaster elsewhere)" descriptions of tiling on brick or concrete walls, columns, etc shall be deemed to include 1:4 cement plaster backing and descriptions of tiling on concrete floors etc shall be deemed to include 1:3 plaster bedding Tiling described as "fixed with adhesive on power floated concrete" shall be deemed to include for approved tiling key-coat Ceramic, porcelain, marble and granite tiles are to be fixed and grouted with suitable adhesives and grouts as recommended by the manufacturer of the tiles FLOOR TILING 600 x 600 x 9mm full body Porcelain matt tiles (PC Sum R450/m2) with 3mm dove grey grouting spacing in between tiles fixed with adhesive and with a soft joint every 3m on 25mm cement screed (elsewhere) OR similar approved.				
2.14.1		On floors	m2	420.00		
2.14.2		100mm High cut tile skirting	m	180.00		
2.14.3		600 x 600 x 9mm full body Porcelain non skidding tiles (PC Sum R500/m2) with 3mm dove grey grouting spacing in between tiles fixed with adhesive and with a soft joint every 3m on 25mm cement screed (elsewhere) OR similar approved. On floors and landings	m2	1,292.00		
2.14.4		WALL TILING 300 x 300 x 3mm FULL BODIED Porcelain tiles (PC Sum 400/m2) with 3mm spacing in between fixed with dove grey grouting and with a soft joint every 3m OR similar approved On walls	m2	780		
2.14.5		Aluminium dividing strips 15 x 8mm Flat section dividing strips between tiles Aluminium corner protectors, stair nosings, expansion joint strips, etc	m	168		
2.14.6		Corner protectors	m	136.00		
2.14.7		Stair nosings	m	124.80		
2.14.8		Single expansion joint strips with vinyl inlay	m	810.00		
TILING CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.14)						

BILLS OF QUANTITIES SECTION 2 : PLUMBING AND DRAINAGE (PROVISIONAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
2.15		SECTION NO.2 BILL NO. 15 PLUMBING AND DRAINAGE (PROVISIONAL) NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors SUPPLEMENTARY PREAMBLES Vitrified clay pipes etc Pipes shall rest on solid ground and, where necessary, pockets of sufficient size shall be cut around joints to enable the jointing to be properly performed or, alternatively, pipes shall be bedded full length on and including unreinforced concrete laid in a semi-dry state immediately before pipes are laid uPVC pipes and fittings Sewer and drainage pipes and fittings shall be jointed and sealed with butyl rubber rings Soil, waste and vent pipes and fittings shall be solvent weld jointed uPVC pressure pipes and fittings Pipes for water supply shall be of the class stated Pipes of 40mm diameter and smaller shall be plain ended with solvent welded uPVC loose sockets and fittings Pipes of 50mm diameter and greater shall have sockets and spigots with push-in type integral rubber ring joints. Bends shall be uPVC and all other fittings shall be cast iron, all with similar push-in type joints Copper pipes Pipes shall be hard drawn and half-hard pipes of the class stated. Class 0 (thin walled hard drawn) pipes shall not be bent. Class 1 (thin walled half-hard), class 2 (half-hard) and class 3 (heavy walled half-hard) pipes shall only be bent with benders with inner and outer formers. Fittings to copper waste, vent and anti-siphon pipes, capillary solder fittings and compression fittings shall be "Cobra Watertech" type. Capillary solder fittings shall comply with ISO 2016. Only compression fittings shall be used in walls or in ground Reducing fittings Where fittings have reducing ends or branches they are described as "reducing". In the case of pipes with diameters not exceeding 60mm only the largest end or branch size is given. Should the contractor wish to use other fittings and bushes or reducers he may do so on the understanding that no claim in this regard will be entertained. In the case of pipes with diameters exceeding 60mm all sizes are given and no claim for extra bushes, reducers, etc will be entertained Wire gratings Descriptions of gutter outlets etc shall be deemed to include wire balloon gratings Exposed concrete surfaces Exposed surfaces of concrete stormwater channels, cover slabs, inspection eye marker slabs, gully tops, cleaning eye tops, catchpits, inspection chambers, etc shall be finished smooth with plaster Excavations				
Carried Forward						-

BILLS OF QUANTITIES SECTION 2 : PLUMBING AND DRAINAGE (PROVISIONAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						-
		No claim for rock excavation will be entertained unless the contractor has timeously notified the quantity surveyor thereof prior to backfilling Soft rock and "hard rock" shall be as defined in "Earthworks" Laying, backfilling, bedding, etc of pipes Pipes shall be laid and bedded and trenches shall be carefully backfilled in accordance with manufacturers' instructions Where no manufacturers' instructions exist pipes shall be laid in accordance with clauses 5.1 and 5.2 of each of the following: SABS 1200 L : Medium-pressure pipelines LD : Sewers LE : Stormwater drainage Pipe trenches etc shall be backfilled in accordance with clauses 3, 5.5, 5.6, 5.7 and 7 of SABS 1200 DB : Earthworks (Pipe trenches) Pipes shall be bedded in accordance with clauses 3.1 to 3.4.1, 5.1 to 5.3 and 7 of SABS 1200 LB : Bedding (Pipes). Unless otherwise described bedding of rigid pipes shall be class B bedding Flush pans Flush pans shall have straight or side outlets and "P" or "S" traps as necessary Stainless steel basins, sinks, wash troughs, urinals, etc Units shall have standard aprons on all exposed edges and tiling keys against walls where applicable Waste unions Descriptions of waste unions shall be deemed to include rubber or vulcanite plugs and chains fixed to fittings TAPS, VALVES, ETC				
2.15.1		Wash hand basin <u>mixer tap</u> (Prime Cost Amount R1100 each delivered to site)	No	22.00		
		SANITARY FITTINGS				
		"Geberit"				
2.15.2		Kombi fix concealed Omega cistern wall hung WC, top actuated with Omega30 dual flush actuator including flush pipe and pan connector, water supply connection with angle stop valve, protection cover for service opening and protection cover for flush pipe, fixed with and included fastening materials in "Prewall" bricks.	No	45.00		
2.15.3		Wash hand basin (Prime Cost Amount R1250 each delivered to site)	No	22.00		
2.15.4		Urinal "Preda" concealed flush control 665 x 370 x 310mm	No	22.00		
2.15.5		Paraplegic toilet (Prime Cost Amount R2400 each delivered to site)	No	11.00		
2.15.6		Showers Including Glass Doors (Prime Cost Amount R 2600 each delivered to site)	No	12.00		
		FULLBORES				
Carried Forward						

BILLS OF QUANTITIES SECTION 2 : PLUMBING AND DRAINAGE (PROVISIONAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
2.15.7		Saint-Gobain or other equally and approved unbreakable ductile iron fullbore outlets to flat roofs 180° centre bolt vertical roof outlet overall size 350mm diameter and 125mm deep with and including a domical grating head of size 205mm diameter and 85mm deep and a 130mm diameter outlets/ vertical spigot opening including the dressing of waterproofing membrane around the perimeter of the outlet	No	12.00		
2.15.8		SUNDRIES Testing water pressure of entire plumbing Water supply to be fixed in basement floor and the entire plumbing to be tested for water pressure and flow	Item	1.00		
PLUMBING AND DRAINAGE CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.15)						

BILLS OF QUANTITIES SECTION 2 : GLAZING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.2				
2.16		BILL NO. 16 GLAZING NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors TOPS, SHELVES, DOORS, MIRRORS, ETC 6mm GSA smartglass image copper-free mirror, glazed in accordance with NBR N schedule 1 and SABS 0137				
2.16.1		Mirror approximately 1 160 x 1440mm high with 48mm screws GLAZING TO ALUMINIUM WITH SCREWED-ON BEADS 6mm safety glass including fixing, to cut to panes of sizes to fit properly into aluminium frames and subframes as per "Door and Window Schedule_Rev 00".	No	22.00		
2.16.2		Unitised glass panels not exceeding 0.5m2	m2	6.48		
2.16.3		Unitised glass panels exceeding 0.5m2 and not exceeding 2m2 8mm safety glass including fixing, to cut to panes of sizes to fit properly into aluminium frames and subframes as per "Door and Window Schedule_Rev 00".	m2	13.39		
2.16.4		Unitised glass panels not exceeding 0.5m2	m2	6.48		
2.16.5		Unitised glass panels exceeding 0.5m2 and not exceeding 2m2	m2	7.99		
2.16.6		Unitised glass panels exceeding 2m2 and not exceeding 4m2 8mm toughened safety glass including fixing, to cut to panes of sizes to fit properly into aluminium frames and subframes as per "Door and Window Schedule_Rev 00".	m2	51.78		
2.16.7		Unitised glass panels exceeding 2m2 and not exceeding 4m2	m2	36.17		
2.16.8		Unitised glass panels exceeding 4m2 and not exceeding 6m2	m2	47.46		
2.16.9		Unitised glass panels exceeding 6m2 and not exceeding 8m2	m2	41.66		
		PATENT GLAZING Patent and/or specialist designed glazing system of low-E safety glass skin including fixing the glass panel, to sizes to fit properly in aluminium frames as per "Shopfront Schedule Rev 00".				
2.16.10		Unitised glass panels exceeding 4m2 and not exceeding 6m2	m2	23.00		
2.16.11		Unitised glass panels exceeding 6m2 and not exceeding 8m2	m2	85.60		
2.16.12		Unitised glass panels exceeding 12m2 and not exceeding 14m2	m2	150.00		
2.16.13		Unitised glass panels exceeding 14m2 and not exceeding 16m2	m2	142.00		
GLAZING CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.16)						

BILLS OF QUANTITIES SECTION 2 : PAINTWORK

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.2				
		BILL NO. 17				
2.17		PAINTWORK				
		NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors				
		PAINTWORK, ETC TO NEW WORK ON				
		FLOATED PLASTER SURFACES WITH				
		One coat alkali resistant plaster primer and two coats PVA acrylic emulsion paint on				
2.17.1		Internal walls	m2	5,740.00		
2.17.2		Drywall Partitions	m2	1,051.20		
2.17.3		On ceilings	m2	168.75		
		One coat alkali resistant plaster primer and two coats modified acrylic fine textured emulsion paint on				
2.17.4		External walls	m2	477.00		
		PAINT ON WOOD				
		One universal undercoat and apply two full coats washable mat enamel paint				
		Three coats superior quality clear gloss varnish				
2.17.5		Skirtings, rails, etc not exceeding 300mm girth	m	404.00		
2.17.6		On doors	m2	839.52		
		ON METAL SURFACES				
		One coat alkyd based zinc phosphate primer and two coats premium quality polyurethane enamel paint, on steel				
2.17.7		Gates, grilles, burglar screens etc (both sides measured over the full flat area)	m2	112.80		
		Final painting of exposed structural steelwork				
		Spot prime bare patches in pre-primed surfaces with in chromate primer, one coat universal undercoat and two finishing coats of gloss enamel paint on:				
2.17.8		General surfaces of exposed structural steelwork	m2	1,960.00		
PAINTWORK CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.17)						

BILLS OF QUANTITIES SECTION 2 : EXTERNAL WORKS

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.2				
		BILL NO. 18				
2.18		EXTERNAL WORKS				
		FENCING				
2.18.1		2.1m high Clearvue Fence with steel posts at 3000mm centres, including 20MPA mass concrete bases 300x300x450mm deep	m	1,350.00		
		METALWORK				
2.18.2		8 x 2.1m high metal gate (Complete, electronically operated)	No	2.00		
2.18.3		1.2 x 2.1m high metal side gate	No	3.00		
EXTERNAL WORKS CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.18)						

BILLS OF QUANTITIES SECTION 2 : PROVISIONAL SUMS

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.2				
		BILL NO. 19				
2.19		PROVISIONAL SUMS, ETC				
		NOTE: For Preambles see the Model Preambles for Trades 2008 edition published by the Association of South African Quantity Surveyors Preliminaries The contractor is referred to the Preliminaries section of the Bills of Quantities for further amplification of "Prime Cost Amounts and Provisional Sums"				
		PROVISIONAL SUMS AND PRIME COST AMOUNTS				
		SPECIALIST'S WORK				
		The following provisional sums and prime cost amount are NETT COST of the work described. The contractor shall not be entitled to any discount, percentage or allowance what so ever on the value of any provisional sum or prime cost amount other the priced value for profit and attendance as provided for. The provisional sums and prime cost amounts may be deducted in whole or in part from the contract and are subject to adjustment upon completion				
		In general specialist installations envisaged will be of the following, but not limited thereto; Fitted Seating, Signage and Kids Play Area				
		SPECIALIST INSTALLATION				
		PROVISIONAL SUMS FOR NOMINATED/SELECTED SUBCONTRACT WORKS				
2.19.1		Provide the Provisional sum of R 750 000 supply and installation of 2000 public plus 200 VIP seats on reinforced concrete structure by subcontractor	Prov Sum	1.00	R 750,000.00	R 750,000.00
2.19.2		Allow for profit if required	%	750,000.00		
2.19.3		Allow for attending to subcontractor	%	750,000.00		
2.19.4		Provide the Provisional sum of R 50 000 for supply and installation of Signage (Regulatory Fire Signage Elsewhere) by a subcontractor	Prov Sum	1.00	R 50,000.00	R 50,000.00
2.19.5		Allow for profit if required	%	50,000.00		
2.19.6		Allow for attending to subcontractor	%	50,000.00		
2.19.7		Provide the Provisional sum of R 350 000 for supply and fixing of Kidz Play Area by a subcontractor	Prov Sum	1.00	R 350,000.00	R 350,000.00
2.19.8		Allow for profit if required	%	350,000.00		
2.19.9		Allow for attending to subcontractor	%	350,000.00		
2.19.10		Provide the Provisional sum of R 250 000 for reinforcement scanning by a specialist	Prov Sum	1.00	R 250,000.00	R 250,000.00
2.19.11		Allow for profit if required	%	250,000.00		
2.19.12		Allow for attending to subcontractor	%	250,000.00		
2.19.13		Provide the Provisional sum of R 450 000 for change room fit outs including benches and lockers by subcontractor	Prov Sum	1.00	R 450,000.00	R 450,000.00
2.19.14		Allow for profit if required	%	450,000.00		
2.19.15		Allow for attending to subcontractor	%	450,000.00		
2.19.16		Provide the Provisional sum of R 500 000 for kitchen cupboards including stainless steel worktops by subcontractor	Prov Sum	1.00	R 500,000.00	R 500,000.00
2.19.17		Allow for profit if required	%	500,000.00		
Carried Forward						

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

Brought forward						
2.19.18	Allow for attending to subcontractor	%	500,000.00	%		
2.19.19	Provide the Provisional sum of R 350 000 for general landscaping by subcontractor	Prov Sum	1.00	R 350,000.00	R	350,000.00
2.19.20	Allow for profit if required	%	1.00			
2.19.21	Allow for attending to subcontractor	%	1.00			
2.19.22	Provide the Provisional sum of R 400 000 for general external furniture by subcontractor	Prov Sum	1.00	R 400,000.00	R	400,000.00
2.19.23	Allow for profit if required	%	400,000.00			
2.19.24	Allow for attending to subcontractor	%	400,000.00			
2.19.25	Provide the Provisional sum of R 460 000 for louvers (sun shields) to shopfronts by subcontractor	Prov Sum	1.00	R 460,000.00	R	460,000.00
2.19.26	Allow for profit if required	%	460,000.00			
2.19.27	Allow for attending to subcontractor	%	460,000.00			
2.19.28	Provide the Provisional sum of R 180 000 for kitchen equipment by subcontractor	Prov Sum	1.00	R 180,000.00	R	180,000.00
2.19.29	Allow for profit if required	%	180,000.00			
2.19.30	Allow for attending to subcontractor	%	180,000.00			
PROVISIONAL SUMS CARRIED FORWARD TO SECTION 2 OF MAIN SUMMARY (ITEM 2.19)						

CLIENT:
TENDER NO.

CITY OF POLOKWANE
PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

SECTION 3 - CIVIL WORKS (Excluding Preliminaries and Generals)

BILLS OF QUANTITIES SECTION 3 : SITE CLEARANCE AND DEMOLITIONS

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R	C
3.1	SABS	<u>SITE CLEARANCE AND DEMOLITIONS</u>					
3.1.1	8.2.1	Clear and grub the Site					
3.1.1.1		a) Softball Stadium Site	ha	-			
3.1.2	8.2.2	Remove and grub large trees and tree stumps of girth					
3.1.2.1		a) Over 1m and up to and including 2m	No.	-			
3.1.2.2		b) Over 2m and up to and including 3m	No.	-			
3.1.2.3		c) Over 3m and up to and including 4m	No.	-			
3.1.3	8.2.4	Re-ClearSurfaces (Only on instructions from the Engineer)	ha	1.94			
3.1.4	8.2.5	Take down existing fences	km	-			
3.1.5	8.2.7	Dismantle and remove pipelines, electricity transmission line cables etc.					
3.1.5.1		a) Concrete Pipes , Diameter 0 to 250mm	m	-			
3.1.5.2		b) Concrete Pipes , Diameter 250 to 600mm	m	-			
3.1.5.3		c) Concrete Pipes , Diameter 600 to 1500mm	m	-			
3.1.5.4		d) Other Pipes, Diameter 0 to 250mm	m	-			
3.1.5.5		e) Other Pipes, , Diameter 250 to 600mm	m	-			
3.1.5.6		f) Other Pipes, , Diameter 600 to 1500mm	m	-			
3.1.5.7		h) Electricity Cables	m	-			
3.1.5.8		g) Other Cables	m	-			
3.1.6	8.2.8	Demolish and remove structures/buildings and dismantle					
3.1.6.1		Concrete slab in part	m ³	6.00			
3.1.6.2		Concrete beams	m ³	4.00			
3.1.6.3		Concrete steps	m ³	12.00			
3.1.6.4		One brickwalls	m2	50.40			
3.1.7	8.2.9	Transport materials and debris to unspecified sites and dump (Prov)	m ³ .km	1,973.09			
3.1.8	8.2.10	Remove topsoil to nominal depth of 150mm and stockpile					
3.1.8.1		a) Softball Stadium Site	m ³	-			
3.1.9		Budgetary Allowance for remedial works	PS	1.00	R 4,000,000.00	R	4,000,000.00
3.1.10		Allow for handling cost	%	4,000,000.00			
SITE CLEARANCE AND DEMOLITIONS CARRIED FORWARD TO SECTION 3 OF MAIN SUMMARY (ITEM 3.1)							

BILLS OF QUANTITIES SECTION 3 : EARTHWORKS

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
3.2	SABS	<u>EARTHWORKS (Building Platforms,Parking)</u>				
3.2.1	8.3.2	Bulk Excavation				
3.2.1.1		a) Excavate in all materials and use for embankment or backfill or dispose to Designated Site X.				
3.2.1.1.1		1) Softball Stadium Site	m ³	-		
3.2.1.2		b) Extra over items for :				
3.2.1.2.1		1) Intermediate excavation	m ³	-		
3.2.1.2.2		2) Hard rock excavation	m ³	-		
3.2.1.2.3		3) Boulder Excavation, Class A	m ³	-		
3.2.1.2.4		4) Boulder Excavation, Class B	m ³	-		
3.2.2	8.3.3	Restricted Excavation				
3.2.2.1		a) Excavate for restricted foundations, footing in all materials and use for backfill or embankment or dispose				
3.2.2.1.1		1) Softball Stadium Site	m ³	-		
3.2.2.2		b) Extra over items for :				
3.2.2.2.1		1) Intermediate excavation	m ³	-		
3.2.2.2.2		2) Hard rock excavation	m ³	-		
3.2.2.2.3		3) Boulder Excavation, Class A	m ³	-		
3.2.2.2.4		4) Boulder Excavation, Class B	m ³	-		
3.2.3	8.3.4	Importing of materials:				
3.2.3.1		a) Extra over for importation of materials from				
3.2.3.1.1		1) Commercial sources	m ³	-		
3.2.3.1.2		2) Borrow Pit	m ³	-		
3.2.3.2		b) Opening up and closing down of designated borrow pit	Sum	-		
3.2.3.3		c) Dealing with overburden (designated borrow pits only)	m ³	-		
3.2.4	8.3.5	Extra Excavation in all Materials to Provide Working Space around structures	m ³	-		
3.2.5	8.3.6	Overhaul				
3.2.5.1		a) Limited overhaul (provisional)	m ³ .km	-		
3.2.5.2		b) Long overhaul (provisional)	m ³ .km	-		
3.2.6	8.3.8	Existing Services				
3.2.6.1	8.3.8.1	Location				
3.2.6.1.1		a) Supply specialist equipment for detection	sum	-		
3.2.6.1.2		b) The use or hire of specialist equipment for detection.	Hour	-		
3.2.6.1.3		c) Excavate by Hand in soft material to expose existing services	m ³	-		
Carried Forward						

CLIENT:
TENDER NO.

CITY OF POLOKWANE
PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

BILLS OF QUANTITIES SECTION 3 : EARTHWORKS

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.2.6.2	8.3.8.2	Dealing with Services that are at risk because of the construction of earthworks				
3.2.6.2.1		a) Cables	No.	-		
3.2.6.2.2		b) Permanent protection of Water Pipes	Sum	-		
3.2.6.2.3		c) Temporary protection of Water Pipes	Sum	-		
EARTHWORKS CARRIED FORWARD TO SECTION 3 OF MAIN SUMMARY (ITEM 3.2)						

BILLS OF QUANTITIES SECTION 3 : SEWER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
3.3		SEWER RETICULATION				
3.3.1	SANS 1200 C	<u>SITE CLEARANCE</u>				
3.3.1.1	PSC 8.2.1	Clear and grub	ha	0.014		
3.3.1.2	8.2.2	Remove and grub large trees and tree stumps of girth				
3.3.1.2.1		a) Over 1m and up to and including 2m	No.	-		
3.3.1.2.2		b) Over 2m and up to and including 3m	No.	-		
3.3.1.2.3		c) Over 3m and up to and including 4m	No.	-		
3.3.2	SANS 1200DB PSDB8-3	<u>EARTH WORKS (PIPE TRENCHES)</u>				
		<u>EXCAVATION</u>				
3.3.2.1	8.3.2a	a) Excavate in all materials for trenches, backfill, compact and dispose of surplus material for:				
		Pipes over 125 mm up to 700 mm dia for depths				
		Over and Up to				
3.3.2.1.1		0.0 m 0.5 m	m ³	-		
3.3.2.1.2		0.5 m 1.5 m	m ³	-		
3.3.2.1.3		1.5 m 2.5 m	m ³	105.05		
3.3.2.1.4		2.5 m 3.5 m	m ³	45.00		
3.3.2.1.5		3.5m 4.5 m	m ³	-		
3.3.2.1.6		4.5m 5.5 m	m ³	-		
3.3.2.1.7		5.5m 6.5 m	m ³	-		
3.3.2.1.8		6.5m 7.5 m	m ³	-		
3.3.2.2	8.3.2b	b) Extra-over item (a) above for:				
3.3.2.2.1		i) intermediate excavation	m ³	15.00		
3.3.2.2.2		ii) hard rock excavation	m ³	37.51		
3.3.2.2.3		iii) Boulder rock excavation Class A	m ³	-		
3.3.2.2.4		iii) Boulder rock excavation Class B	m ³	-		
3.3.2.3	8.3.2.c	Excavate and dispose of unsuitable material from trench bottom (provisional)	m ³	-		
3.3.3	8.3.3	<u>EXCAVATION ACILLIARIES</u>				
3.3.3.1	8.3.3.1	Make up deficiency in backfill material (provisional)				
		a) from other necessary excavations on site	m ³	97.53		
		b) by importation from commercial or off-site sources selected by the Contractor	m ³	52.52		
3.3.3.2	8.3.3.3	Compaction in road reserves	m ³	100.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : SEWER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.3.4	8.3.4	PARTICULAR ITEMS				
		b) Temporary works: Control ground water inflow from anywhere on site				
		1.) Provide equipment	Sum	1.00		
		2.) Operate and maintain	Days	40.00		
		3.) Remove equipment	Sum	1.00		
3.3.5	8.3.5	Existing Services-that Intersect or Adjoin a Pipe Trench				
		a) Services that intersect a trench	No.	-		
		b) Services that adjoin a trench	m	-		
		c) Connection into services already in existence	No.	-		
3.3.6	8.3.6	FINISHING				
3.3.6.1	8.3.6.1	Reinstate road surfaces complete with all courses				
	8.3.6.1a	a) Gravel on shoulders 150mm thick compacted to 93% MOD AASHTO	m ²	-		
	8.3.6.1b	b) G6 material and compact to 93% MOD AASHTO in layers of 150mm	m ²	-		
	8.3.6.1c	c) G5 material and compact to 93% MOD AASHTO in layers of 150mm	m ²	-		
	8.3.6.1d	d) C4 stabilised material and compacted to 98% MOD AASHTO in layers of 150mm	m ²	-		
	8.3.6.1e	e) G1 material and compact to 86% apparent density in layers of 150mm	m ²	-		
	8.3.6.1f	f) Continuously TPA graded medium asphalt of thickness 25 mm , including approved prime and tack coat preparation for roadway	m ²	-		
3.3.6.2	8.3.3.4	OVERHAUL				
3.3.6.3.1	8.3.3.4a)	.01) Limited Overhaul (Provisional)	m ³ .km	-		
3.3.6.3.2	8.3.3.4b)	.02) Long Overhaul (Provisional)	m ³ .km	-		
3.3.7	SANS 1200D	EARTH WORKS				
3.3.7.1	8.3.3	Restricted Excavations				
3.3.1.1	8.3.a	Excavate for restricted foundations, footings and trenches for all materials and use for backfill or embankment or dispose	m ³	-		
3.3.1.2	8.3.3b	Extra Over Items				
3.3.1.2.1	8.3.3b)1)	.01 Intermediate excavation	m ³	-		
3.3.1.2.2	8.3.3b)2)	.02 Hard Rock Excavation	m ³	-		
3.3.1.2.3	8.3.3b)3)	.03 Boulder Excavations, Class A	m ³	-		
3.3.1.2.4	8.3.3b)4)	.03 Boulder Excavations, Class B	m ³	-		
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : SEWER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.3.8	SABS 1200 LB PSLB	BEDDING FOR PIPES				
		PROVISION OF BEDDING for Class B bedding as per Dwg "INF-SE-SD-001 "				
3.3.8.1	8.2.1	Provision of bedding from trench excavations:				
		a) Selected granular material	m ³	9.45		
		b) Selected fill material	m ³	12.60		
3.3.8.2	8.1.6	Supply only of bedding by importation:				
3.3.8.2.1	8.2.2.1	Provision of Class B bedding from trench excavation elsewhere (greater than 0,5km) of: (Prov.)				
		a) Selected granular material	m ³	9.45		
		b) Selected fill material	m ³	12.60		
3.3.8.2.2	8.2.2.3	Commercial sources (provisional)				
		a) Selected granular material	m ³	9.45		
		b) Selected fill material	m ³	12.60		
3.3.8.2.3	8.2.2.4	Sub-surface drainage in trenches, Supply and install subsoil drainage system				
		a) 19mm stone	m ³	30.00		
		b) 13mm stone	m ³	30.00		
		c) Filter fabric, Kaymat U14 or similar approved	m ²	150.00		
		d) Perforated 110mm dia. HDPE	m	150.00		
3.3.8.3	8.2.3	Concrete bedding cradle(Provisional)				
		1) Class 20 Mpa/19mm	m ³	10.00		
3.3.8.4	8.2.3	Encasing of pipes in concrete: (Provisional)				
		1) Class 20 Mpa/19mm	m ³	15.00		
3.3.9	SANS 1200LD	SECTION E: Sewer pipes & related items Supply & lay the following sewerage pipes with required couplings :				
	PSL8.2	(Note: Rates submitted as "Rate Only" must be fair and balanced as it may be used to determine the contract value)				
3.3.9.1	LD8.2.1	160 mm Ø Class 12 uPVC heavy duty under ground sewer pipe as per SANS 1601	m	-		
3.3.9.2	LD8.2.2	250 mm Ø Class 12 uPVC heavy duty under ground sewer pipe as per SANS 1601	m	70.00		
		300 mm Ø Steel Pipe	m	20.00		
3.3.10		Sewer manholes				
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : SEWER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
		Construct 1 000 mm Ø pre-cast concrete manholes complete with manhole base, manhole rings, 150 mm concrete cover slab and 560 mm Ø heavy duty concrete lid with steel band for the following depths :				
3.3.10.1	LD8.2.3	From 0.0 m up to and including 1.5 m	no	13.00		
3.3.10.2	LD8.2.3	From 1.5 m up to and including 2.0 m	no	4.00		
3.3.10.3	LD8.2.3	From 2.0 m up to and including 3.0 m	no	4.00		
3.3.10.4	LD8.2.3	From 3.0 m up to and including 4 m	no	1.00		
3.3.10.5	LD8.2.3	From 4.0 m up to and including 5.0 m	no	1.00		
3.3.10.6	LD8.2.3	From 5.0 m up to and including 6.0 m	no	1.00		
3.3.11		Sewer erf (yard) connections				
		Erf connection complete as described on drawing Dwg "INF-SE-SD-001"				
3.3.11.1		160 mm Ø x 110 mm Ø x 45° plain junction (spigot/socket)	no	1.00		
3.3.11.2		110 mm Ø x 45° plain bend (spigot/socket)	no	1.00		
3.3.11.3		110 mm Ø x 22.5° plain bend (spigot/socket)	no	1.00		
3.3.11.4		110 mm Ø Class 400 heavy duty under ground sewer pipe as per SANS 1601	m	1.00		
3.3.11.5		100 mm Ø end cap	no	1.00		
3.3.11.6		Apply 3 m length of 3 mm galvanized wire tied around 100 mm Ø sewer pipe where it joints the end cap to extrude from the ground to indicate where the future connection can be made	m	90.00		
3.3.11.7		Extra over stand connection for the connection from existing sewer lines (item shall be inclusive of searching out the connection point, excavation, to allow adequate working space, the cutting into the existing pipe, placing the required connection item with the and the placing of wires to indicate the position) and the placing of wires to indicate the position) and the placing of wires to indicate the position)	no	2.00		
3.3.12		Ancillary items				
3.3.12.1		Connection to existing sewer manholes (item shall be inclusive of space, the cutting into the existing pipe, placing the required connection item with the required couplings, the compaction & backfill of excavated material and the placing of a marker wire to indicate the position)	no	1.00		
3.3.12.2		Construct anchor supports & encasements from 15 Mpa concrete (for sizes & positions see drawing "INF-SE-SD-001")	m³	10.00		
3.3.13		Outlet				
3.3.13.1		500 mm x 500 mm x 250 mm base from 25 Mpa concrete	no	1.00		
3.3.13.2		300 mm x 300 mm x 1,150 mm pedestal from 25 Mpa concrete, to be painted universal undercoat and 2 coats of yellow coloured oil based paint	no	1.00		
Carried Forward						

CLIENT:
TENDER NO.

CITY OF POLOKWANE
PM47/2023
ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

BILLS OF QUANTITIES SECTION 3 : SEWER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.3.14		TESTING				
3.3.14.1		Testing of manholes	No	21.00		
3.3.14.2		Testing of sewers				
3.3.14.2.1		1.160mm dia (Specify test)	m	295.00		
3.3.14.2.2		2.250mm dia (Specify test)	m	385.00		
3.9.3		CCTV camera inspections				
		1. 160mm dia	m	100.00		
SEWER CARRIED FORWARD TO SECTION 3 OF MAIN SUMMARY (ITEM 3.3)						

BILLS OF QUANTITIES SECTION 3 : WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		WATER RETICULATION				
3.4	1200 C PSC	<u>SITE CLEARANCE</u>				
3.4.1	8.2.1	Clear and grub	ha	-		
3.4.2	8.2.2	Remove and grub large trees and tree stumps of girth				
		a) Over 1m and up to and including 2m	No.	-		
		b) Over 2m and up to and including 3m	No.	-		
		c) Over 3m and up to and including 4m	No.	-		
3.4.3	8.2.5	Take down existing fences regardless of height	km	-		
		a) Wire Mesh fences complete	m	-		
		b) Steel Palisade fence	m	-		
		c) Brick work (up to 230mm thick) fences	m	-		
		d) Pre-fabricated concrete fences complete	m	-		
3.4.4	8.2.7	Dismantle and remove pipelines, electricity transmission line cables etc.	m	-		
3.4.5	8.2.8	Demolish and remove structures/ building and dismantle steelwork, etc	Sum	-		
3.4.6	8.2.9	Transport materials and debris to unspecified sites and dump (Prov)	m ³ .km	-		
3.4.7	8.2.10	Remove topsoil to nominal depth of 150mm and stockpile	m ³	-		
	SANS 1200DB PSDB8-3	<u>EARTH WORKS (PIPE TRENCHES) EXCAVATION</u>				
3.4.8	8.3.2a	a) Excavate in all materials for trenches, backfill, compact and dispose of surplus material for:				
		Pipes over 125 mm up to 700 mm dia for depths				
		Over and Up to				
		0.0 m 0.5 m	m ³	-		
		0.5 m 1.5 m	m ³	-		
		1.5 m 2.5 m	m ³	-		
3.4.9	8.3.2b	b) Extra-over item (a) above for:				
		i) intermediate excavation	m ³	-		
		ii) hard rock excavation	m ³	-		
		iii) Boulder rock excavation Class A	m ³	-		
		iii) Boulder rock excavation Class B	m ³	-		
3.4.10	8.3.2.c	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m ³	-		
3.4.11	8.3.3	EXCAVATION ACILLIARIES				
		a) from other necessary excavations on site	m ³	-		
		b) by importation from commercial or off-site sources selected by the Contractor	m ³	-		
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.4.11	8.3.3.3	Compaction in road reserves	m ³	-		
	8.3.4	PARTICULAR ITEMS				
3.4.12		b) Temporary works: Control ground water inflow from anywhere on site				
		1.) Provide equipment	Sum	-		
		2.) Operate and maintain	Days	-		
		3.) Remove equipment	Sum	-		
3.4.13	8.3.5	Existing Services-that Intersect or Adjoin a Pipe Trench				
		a) Services that intersect a trench	No.	-		
		b) Services that adjoin a trench	m	-		
		c) Connection into services already in existence	No.	-		
3.4.14	8.3.6	FINISHING				
	8.3.6.1	Reinstate road surfaces complete with all courses				
	8.3.6.1a	a) Gravel on shoulders 150mm thick compacted to 93% MOD AASHTO	m ²	-		
	8.3.6.1b	b) G6 material and compact to 93% MOD AASHTO in layers of 150mm	m ²	-		
	8.3.6.1c	c) G5 material and compact to 93% MOD AASHTO in layers of 150mm	m ²	-		
	8.3.6.1d	d) C4 stabilised material and compacted to 98% MOD AASHTO in layers of 150mm	m ²	-		
	8.3.6.1e	e) G1 material and compact to 86% apparent density in layers of 150mm	m ²	-		
	8.3.6.1f	f) Continuously TPA graded medium asphalt of thickness 25 mm , including approved prime and tack coat preparation for roadway	m ²	-		
3.4.15	8.3.3.4	OVERHAUL				
	8.3.3.4a)	.01) Limited Overhaul (Provisional)	m ³ .km	-		
	8.3.3.4b)	.02) Long Overhaul (Provisional)	m ³ .km	-		
	SANS 1200D	EARTH WORKS				
3.4.16	8.3.3	Restricted Excavations				
3.4.16.1	8.3.a	Excavate for restricted foundations, footings and trenches for all materials and use for backfill or embankment or dispose	m ³	-		
3.4.16.2	8.3.3b	Extra Over Items				
	8.3.3b)1)	.01 Intermediate excavation	m ³	-		
	8.3.3b)2)	.02 Hard Rock Excavation	m ³	-		
	8.3.3b)3)	.03 Boulder Excavations, Class A	m ³	-		
	8.3.3b)4)	.03 Boulder Excavations, Class B	m ³	-		
	1200 LB PSLB	BEDDING FOR PIPES PROVISION OF BEDDING for Class B bedding as per Dwg 100-W-STD02				
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.4.17	8.2.1	Provision of bedding from trench excavations:				
		a) Selected granular material	m3	-		
		b) Selected fill material	m3	-		
	8.1.6	Supply only of bedding by importation:				
3.4.17.1	8.2.2.1	Provision of Class B bedding from trench excavation elsewhere (greater than 0,5km) of: (Prov.)				
		a) Selected granular material	m3	-		
		b) Selected fill material	m3	-		
3.4.17.2	8.2.2.3	Commercial sources (provisional)				
		a) Selected granular material	m3	-		
		b) Selected fill material	m3	-		
3.4.18	8.2.3	Concrete bedding cradle(Provisional)				
		1) Class 20 Mpa/19mmm	m3	-		
3.4.19	8.2.3	Encasing of pipes in concrete: (Provisional)				
		1) Class 20 Mpa/19mmm	m3	-		
3.4.20	SABS 1200 L	MEDIUM-PRESSURE PIPELINES				
3.4.20.1	8.2.1	Supply, handle, lay, bed, joint, test and disinfect with spigot and socket ends to SABS 966, Part 2 (1988)				
3.4.20.1.1	8.2.1.a	uPVC/mPVC (I.e DPI/Sekunjalo/Marley) Class 12:				
		.01 110mm Diameter	m	-		
		.02 160mm Diameter	m	-		
		.03 200mm Diameter	m	-		
		.04 250mm Diameter	m	21.00		
3.4.20.1.2	8.2.1.b	High Density Polyethylene Pressure pipe (HDPE):				
		Type V Class PN12.5. (PE 80)				
		.01 50mm Diameter	m	770.00		
		.01 110mm Diameter	m	370.00		
3.4.20.2	8.2.2	Extra over items 8.2.1 for the supplying, laying, and bedding of uPVC Specials complete with couplings: as per Drawing No. "INF-WT-SD-003"				
		.01 11.25° bends:				
		.01 160mm Diameter	No.	-		
		.02 200mm Diameter	No.	-		
		.03 250mm Diameter	No.	2.00		
		.02 22.5° bends:				
		.01 160mm Diameter	No.	-		
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C	
Brought forward							
3.4.20.3		.02 200mm Diameter	No.	-			
		.03 250mm Diameter	No.	2.00			
		.03 45° bends:					
		.01 160mm Diameter	No.	-			
		.02 200mm Diameter	No.	-			
		.03 250mm Diameter	No.	2.00			
3.4.20.4		.04 90° bends:					
		.01 160mm Diameter	No.	-			
		.02 200mm Diameter	No.	-			
		.03 250mm Diameter	No.	2.00			
		.05 Tees:					
		.01 160mm Diameter	No.	-			
3.4.20.5		.02 200mm Diameter	No.	-			
		.03 250mm Diameter	No.	2.00			
		.06 Reducing tees:					
3.4.20.6		.01 160mm Diameter x 90 mm Diameter	No.	-			
		.02 160mm Diameter x 110mm Diameter	No.	-			
		.03 200mm Diameter x 160mm Diameter	No.	-			
3.4.20.7		.07 Reducers:					
		.01 160mm Diameter x 110 mm Diameter	No.	-			
		.02 200mm Diameter x 160mm Diameter	No.	-			
		.03 250mm Diameter x 200mm Diameter	No.	2.00			
		.08 Flanged adaptors:					
		.01 160mm Diameter	No.	-			
3.4.20.8		.02 200mm Diameter	No.	-			
		.03 250mm Diameter	No.	2.00			
		Extra over items 3.13 for supplying, fixing and bedding of gate valves as per Drawing No. "INF-WT-SD-003"					
3.4.20.9	8.2.3	.01 160mm dia	No.	-			
		.02 200mm dia	No.	-			
		.03 250mm dia	No.	2.00			
3.4.20.10	8.2.3	Extra over items 3.13 for supplying, fixing and bedding of fire hydrants including double flanged distance piece between hydrant and tee:					
		.01.....					
		Extra over items 3.13 for cutting of the pipe and the supplying and fixing of the extra coupling:					
3.4.20.11	8.2.4	.01 160mm Diameter	No.	-			
		Carried Forward					

BILLS OF QUANTITIES SECTION 3 : WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.4.21	PSL 8.2.11	.02 200mm Diameter	No.	-		
		.03 250mm Diameter	No.	2.00		
		Anchor/thrust blocks and pedestals:				
		.01 Concrete:				
		.01 Class 20 MPa/19 mm	m³	2.81		
3.4.22	8.2.12	Concrete casing:				
		.01 Class 25 MPa/19 mm	m³	10.00		
3.4.23	8.2.13	Valve and hydrant chambers etc:				
		.01 Valve chamber as per Drawing "INF-WT-SD-004"	No.	1.00		
		.02 Fire hydrant valve chamber as per Dwg "INF-WT-SD-001"	No.	1.00		
3.4.24	PSL 8.2.18	Connection to existing main supply pipe as per Drawing "100-W-STD02"				
		Connect to 250mm Dia existing uPVC Pipe	No.	1.00		
		Connect to 200mm Dia existing uPVC Pipe	No.	1.00		
		Connect to 90mm Dia existing uPVC Pipe	No.	1.00		
	SABS 1200 LF	ERF CONNECTIONS (WATER)				
	8.2.1	<u>Provide erf connections complete:</u>				
3.4.25		Double Erf Connection				
		.01 On the same side of the street as the water pipe	No.	1.00		
		.02 Across the street from the water pipe	No.	1.00		
3.4.26		Single Erf Connection				
		.01 50m Long	No.	1.00		
		.02 12m Long	No.	1.00		
3.4.27		Supply and Install Standpipes as per Drawing No."INF-WT-SD-001"	No.	1.00		
3.4.28	8.2.8	Marker posts				
		.01 Water pipe marker	No.	10.00		
		.01 Valve marker	No.	10.00		
3.4.29		Extra over items 3.13 for the supply and installation of end caps for:				
		.01 160mm Diameter	No.	-		
		.02 200mm Diameter	No.	-		
		.03 250mm Diameter	No.	4.00		
3.4.30		.07) Elster Kent HELIX H4000 Bulk Water Meter 200mm Diameter Performance to ISO4064, BS5728 Class B or other relevant SABS approved water meters.	No.	1.00		
3.4.30.1		.08) Pillar Type Meter Assembly and Box, as per drawing INF-WT-SD-004	No.	2.00		
3.4.30.2		.08) Allow for sprinklers, as per drawing "INF-006A" and "INF-006B"	Item	1.00		
WATER CARRIED FORWARD TO SECTION 3 OF MAIN SUMMARY (ITEM 3.4)						

BILLS OF QUANTITIES SECTION 3 : STORMWATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
3.5	SABS	SECTION 3: STORMWATER DRAINAGE PIPE TRENCHES:				
3.5.1.	8.3.2(a)	EXCAVATION Excavate in all materials for trenches <u>backfill, compact, and dispose of</u> surplus/unsuitable material, for pipe culverts :				
3.5.1.1		300 mm diam. for depths (prov) :				
		.01) up to 2.0 m	m ³	-		
		.02) 2.0 m to 3.0 m	m ³	-		
3.5.1.2		450 mm diam. for depths :				
		.01) up to 2.0 m	m ³	-		
		.02) 2.0 m to 3.0 m	m ³	-		
3.5.1.3		600 mm diam. for depths :				
		.01) up to 2.0 m	m ³	-		
		.02) 2.0 m to 3.0 m	m ³	-		
3.5.1.4		750 mm diam. for depths :				
		.01) up to 2.0 m	m ³	174.76		
		.02) 2.0 m to 3.0 m	m ³	190.47		
3.5.1.5		900 mm diam. for depths :				
		.01) up to 2.0 m	m ³	-		
		.02) 2.0 m to 3.0 m	m ³	-		
3.5.1.6		1200 mm diam. for depths :				
		.01) up to 2.0 m	m ³	-		
		.02) 2.0 m to 3.0 m	m ³	15.00		
		.03) 3.0 m to 4.0 m	m ³	Rate Only		
		1050 mm diam. for depths :				
		.01) up to 2.0 m	m ³	-		
3.5.1.7		.02) 2.0 m to 3.0 m	m ³	-		
		.03) 3.0 m to 4.0 m	m ³	Rate Only		
3.5.2	8.3.2(b)	Extra-over item 3.1.1 for :				
		(a) Intermediate excavation	m ³	95.06		
		(b) Hard rock excavation	m ³	76.05		
3.5.3	8.3.3	Make up deficiency in backfill material from commercial source	m ³	171.10		
	8.3.5	Excavation and protection of existing services	m	-		
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : STORMWATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.5.6	SABS 1200LB	BEDDING AND FILL BLANKET				
3.5.6.1	8.2.1	Provision of bedding (Class B) material from trench excavations				
		01. Selected granular material	m ³	190.11		
		02. Selected fill material	m ³	190.11		
3.5.6.2	8.2.2.1	Provision of bedding (Class B) material by importation where instructed by the Engineer				
		01. Selected granular material	m ³	171.10		
		02. Selected fill material	m ³	171.10		
		03. Geotextile type U14	m ²	30.00		
		04. Natural permeable 19mm stone to subsoil drains from commercial sources	m ³	32.43		
3.5.6.3		Stabilised backfilling (including supply of stabilising agent) of roadway trenches where directed by the Engineer, using 4% PBFC	m ³	50.00		
3.5.7	SABS 1200 LE	PIPES				
3.5.7.1	8.2.1	Supply, handle, lay, bed Class B, concrete pipe Type Ogee and Class 75D pipes				
		a) 300 mm diameter	m	-		
		b) 450 mm diameter	m	-		
		c) 600 mm diameter	m	-		
		d) 750 mm diameter	m	190.47		
		e) 900 mm diameter	m	-		
		f) 1050 mm diameter	m	-		
		g) 1200 mm diameter	m	14.30		
3.5.8		HEADWALLS:				
3.5.8.1	8.2.7	Supply and lay Concrete Inlets & outlets to culverts(Refer to Drawing J111/CIV/408- Concrete outlet structure with energy dissipators)				
		a)900 mm diameter	No	1.00		
		b)1200 mm diameter	No	1.00		
3.5.8.2	8.2.8	<u>NB: Supply and Install Manholes, Catchpits, and the like excluding brickwork but completed according to details of drawings as specified below</u>				
		a) Type A Junction Junction Box as per Details in (DWG STD 004 Sheet 2 of 6) for depths:				
		.01) 1 to 2m	No	3.00		
		.02) 2 to 3.0m	No	-		
		b) Type B Junction Junction Box as per Details in (DWG STD 004 Sheet 3 of 6) for depths:				
		.01) 1 to 2m	No	8.00		
		.02) 2 to 3.0m	No	1.00		
		b) Type C Junction Junction Box as per Details in (DWG STD 004 Sheet 4 of 6) for depths:				
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : STORMWATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
		.01) 1 to 2m	No	4.00		
		.02) 2 to 3.0m	No	5.00		
		c) Type D Junction Junction Box as per Details in <i>(DWG STD 004 Sheet 5 of 6)</i> for depths:				
		.01) 1 to 2m	No	4.00		
		.02) 2 to 3.0m	No	4.00		
		b) Grid/ Field Inlet as Per Details in <i>(DWG STD 002)</i> for Depths				
		.01) 1 to 2m	No	16.00		
		.02) 2 to 3.0m	No	-		
		c) Stormwater kerb inlet as per Details in <i>(DWG STD 007)</i> (7m length)	No	12.00		
3.5.9	SABS 1200 MK 8.2.1	CONCRETE KERBING				
		a) Fig 8b , precast mountable kerb (straight) (see drawings attached)	m	440.00		
		b) Fig 8b, precast mountable curved kerb (radius less than 20m)	m	50.00		
		c) Fig 10 Kerb, Precast Restraining Kerb (See DWG STD 001)	m	924.00		
		d) Fig 7 Kerb, Precast Semi Mountable Kerb (See DWG STD 001)	m	2,706.00		
3.5.10		SUBSURFACE DRAINAGE				
3.5.10.1		Excavate for subsoil drainage systems				
		a) Excavate any material situated within the following depth ranges below the surface				
		.01) 0m up to 1.5m	m ³	230.00		
		.02) Exceeding 1.5m and up to 3.0m	m ³	Rate only		
		.03) Extra over item 3.7.1 above for excavating in hard material irrespective of depth	m ³	Rate only		
3.5.10.2		Impermeable backfill to subsoil drainage systems	m ³	Rate only		
3.5.10.3		Natural permeable native gravel soil to subsoil drains from commercial sources	m ³	498.24		
3.5.11	8.3.7(b)	Dumprock, process and compact (from commercial source)	m ³	Rate only		
3.5.11.1		Supply and install complete subsurface drainage including backfill material as Per DWG STD 005 Unplasticised PVC pipes and fittings, normal duty complete				
		.01) 110 mm dia.perforated or slotted	m	205.00		
		.02) 110 mm dia. Unperforated	m	Rate only		
		.03) 160 mm dia. Perforated or slotted	m	205.00		
		.04) 160 mm dia. Unperforated	m	Rate only		
3.5.11.2		Polyethylene Sheeting 150 micron thick or similar approved material for lining subsoil drainage	m2	Rate only		
3.5.11.3		Geotextile type U14	m2	500.00		
STORMWATER CARRIED FORWARD TO SECTION 3 OF MAIN SUMMARY (ITEM 3.5)						

BILLS OF QUANTITIES SECTION 3 : ROADS AND PARKING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
3.6	1200 DM	ROADS AND PARKING				
		EARTHWORKS (roads, subgrade)				
3.6.1	8.3.2	Preparation of Site				
		b) Preparation and stripping of Site/removal, haulage, and spreading of topsoil to a maximum of 300	m ³	15,000.00		
3.6.2	8.3.3	<u>Treatment of Road-bed</u>				
		a) Roadbed preparation and compaction of material to:				
		1) Minimum of 90% of Mod AASHTO max density	m ³	1.00		
		2) Minimum of 93% of Mod AASHTO max density	m ³	675.68		
		3) Minimum of 100% of Mod AASHTO max density	m ⁴	1.00		
		b) In-place treatment of road-bed in intermediate or hardrock material by:				
		1) Ripping	m ³	1.00		
		2) Blasting	m ³	1.00		
3.6.3	8.3.4	Cut to fill, borrow to fill				
		Cut to fill				
		a) Compact to 90 % of MoD AASHTO max density	m ³	1.00		
		b) Rockfill, process and compact	m ³	1.00		
		Borrow to fill (from commercial source)				
		a) Compact to 90 % of MoD AASHTO max density	m ³	1.00		
		b) Rockfill, process and compact	m ³	1.00		
3.6.4	8.3.5	Selected lower subgrade layer (G9 or better quality material) constructed from stockpiled material, compacted to 93% Mod. AASHTO Max Density.	m ³	1.00		
3.6.5	8.3.6	Extra over SANS1200 items 8.3.4 and 8.3.5 for excavating and breaking down material in				
		a) intermediate excavation	m ³	1.00		
		b) hard excavation	m ³	1.00		
		c) Boulder Excavation Class B	m ³	1.00		
		d) Boulder Excavation Class A	m ³	1.00		
3.6.6	8.3.7	Cut to spoil or stockpile from:				
		a) Soft excavation	m ³	1.00		
		b) Intermediate excavation	m ³	1.00		
		c) hard excavation	m ³	1.00		
		d) Boulder Excavation Class B	m ³	1.00		
		e) Boulder Excavation Class A	m ³	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : ROADS AND PARKING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
3.6.7	8.3.8	Removal of oversize material	m ³	1.00		
3.6.8	8.3.9	Overbreak of Excavation in:				
		a) intermediate excavation	m ³	1.00		
		b) hard excavation	m ³	1.00		
		c) Boulder Excavation Class B	m ³	1.00		
		d) Boulder Excavation Class A	m ³	1.00		
3.6.9	8.3.11	Extra over items SANS 1200 DM 8.3.2, 8.3.4 or 8.3.5 for temporary stockpiling of material	m ³	1.00		
3.6.10	8.3.12	Overhaul	m ³	0.25		
3.6.11	8.3.15	Catchwater mounds and channels and mitre banks and channels	m ³	0.10		
3.6.12	SABS 1200 ME	SUBBASE				
3.6.12.1	8.3.3	Construct 150 mm subbase with G5 material from commercial sources compacted to 97 % Mod. AASHTO Max Density.	m ³	675.68		
3.6.12.2	8.3.5	Process subbase material by stabilising	m ³	675.68		
3.6.12.3	8.3.8	Stabilising agent:				
		a) Road Lime	t	1.00		
		b) Ordinary Portland Cement	t	29.73		
3.6.13	SABS 1200MF	BASE				
3.6.13.1	8.3.3	Construct 150 mm base from imported G1 quality material and compacted to 88% Mod. AASHTO Max Density.	m3	675.68		
3.6.14	SABS 1200 MG	BITUMINOUS SURFACE TREATMENT				
3.6.14.1	8.4.1	Prime Coat using:				
		.01) RTH 1/4 P tar prime	m ²	1.00		
3.6.14.2	8.4.6	Variations in Quantities	L	1.00		
3.6.15	SABS 1200 MH	ASPHALT SURFACING				
3.6.15.1	8.5.1	Prime coat:				
		.01) MC-30	m ²	4,504.56		
3.6.15.2	8.5.4	Asphalt surfacing, continuously graded medium grade aggregate using 60/70 pen grade bitumen				
		.01) 25 mm thick	m ²	4,504.56		
3.6.15.3	8.5.5	Variations in Quantities				
		.01) MC-30	L	1.00		
		.02) 60/70 grade bitumen	m ²	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : ROADS AND PARKING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
3.6.16	SABS	ANCILLARY ROADWORKS				
3.6.16.1	1200MM 8.3.6	Supply and erect complete:				
		Statutory road traffic signs complete:				
		.01) RTM1 (Stop)	No	1.00		
		.02) R2.2 (Yield)	No	1.00		
		04) GL1 (Street Name Signs)	No	1.00		
		.05) W101 (intersection)	No	1.00		
3.6.17		ROAD MARKINGS				
3.6.17.1		Retro-reflective road marking paint				
		a) Longitudinal lines				
		i) 100 mm wide broken or unbroken lines; white, yellow or red	m	150.00		
		ii) 150 mm wide broken or unbroken lines; white, yellow or red	m	150.00		
		b) Transverse lines and other markings				
		i) Broken or unbroken lines ; white or yellow	m²	15.00		
		ii) Lettering and symbols, white or yellow, markings	m²	30.00		
3.6.18		SPEED HUMPS				
3.6.18.1		Speed humps, complete with markings and signs as per drawings	No	1.00		
3.6.19	1200 GA	END BEAMS				
3.6.19.1		Construct insitu 20MPa concrete Fig. 13 end beams (Prov)	m	1.00		
3.6.20		Accommodation Of Traffic				
3.6.20.1		Accommodate traffic, erect road signs, adopt safety precautions, etc,	Sum	1.00		
3.6.21	SABS	PAVING				
	1200 MJ					
3.6.21.1	8.2.2	Construct 60mm concrete paving on and including 25mm compacted sand bedding	m²	15,000.00		
3.6.21.2		Weedkiller	m²	15,000.00		
3.6.21.3		Edge Restraints(fig 12)	m²	1,500.00		
ROADS AND PARKING CARRIED FORWARD TO SECTION 3 OF MAIN SUMMARY (ITEM 3.6)						

BILLS OF QUANTITIES SECTION 3 : SOFTBALL FIELDS (PITCH)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
3.7	1200 DM	SOFTBALL FIELDS A, B AND C				
3.7.1	8.3.2	EARTHWORKS Preparation of Site b) Preparation and stripping of Site/removal, haulage, and spreading of insitu material to a maximum of 100	m ³	1.00		
3.7.2	SABS 1200 ME	SUBBASE				
3.7.2.1	8.3.3	Construct 150 mm subbases with G5 material from commercial sources compacted to 97 % Mod. AASHTO Max Density.	m ³	2,961.00		
3.7.2.1.b		Allow for the provision of density tests to be carried out by the Contractor and pay all charges in connection therewith.	no	711.00		
3.7.3	SABS 1200 DM	SOFTBALL INFELD/ SKINNED AREA AND WARNING TRACK SAND MIX				
3.7.3.1	8.3.4	Importing of Materials Softball Infield and Warning Track				
3.7.3.1.1	8.3.4	a) Extra-over for importation of materials from commercial sources or from borrow pit. (Refer to DWG INF-005 For Sand Specifications)				
		01) Professional Level Infield Sand Mix: A minimum of 98% of particles shall pass the 2.00 mm sieve with the highest portion of sand particles in the medium to very fine range. Silt and Clay distribution shall be relatively equal with the ratio of silt to clay .5 - 1.2. <i>IDEAL RATIO: Sand 60%, Silt 25% & Clay 15%</i>	m ³	172.00		
		02) Intermediate Level Infield Sand Mix: A minimum of 98% of particles shall pass the 2.00 mm sieve with the highest portion of sand particles in the medium to very fine range. Silt and Clay distribution shall be relatively equal with the ratio of silt to clay .5 - 1.2. <i>IDEAL RATIO: Sand 67%, Silt 20% & Clay 13%</i>	m ³	344.00		
		03) Warning Track Sand Mix: Gradation: 50-75% crushed-screen 3/16 inch minus decomposed granite fines and 25-50% Cinder Sand. Or Similar approved	m ³	382.00		
3.7.4		SOFTBALL FIELD GRASS AREA (See DWG INF-004 For Specifications)				
3.7.4.1	8.3.10	Top Soiling a) Import, Spread and Level 100mm Thick Layer of Weed Free Top Soil and Compact Lightly.	m ³	1,377.00		
3.7.4.2	8.3.11	Grassing or other Vegetation Cover a) Import and lay Kikuyu Grass or Alternatively With "Golfing Green" Grass. b) Supply and Install Synthetic Grass 10mm straight yarn with a latex and fibre glass reinforced backing for Bull Pens and Batting Cages	m ² m ²	13,766.00 625.00		
3.7.5	SABS 1200	SOFTBALL FIELD CHAIN FENCES AND GATES				
3.7.5.1		Chain Link Fences a) Fence Type 1 01) Construct and install 1.6m High Chain Link Fence, as per DWG INF-FEN-SD-001 . Installation Includes all Supporting Rails and Fence Fabric (mesh is produced from 2.5mmø to 3.15mmø lightly and heavy galvanized wire in accord with SANS 675:2011). Also includes cost of post installation at 2,4m intervals and all related materials.	m	639.00		
3.7.6	SABS 1200	SOFTBALL FIELD CHAIN FENCES AND GATES				
3.7.6.1		Chain Link Fences				
Carried Forward						

BILLS OF QUANTITIES SECTION 3 : SOFTBALL FIELDS (PITCH)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R	C
Brought forward							
3.7.6.1.1		b) Fence Type 2 .01) Construct and install 2.4m High Chain Link Fence, as per DWG INF-FEN-SD-001 . Installation Includes all Supporting Rails and Fence Fabric (mesh is produced from 2.5mmø to 3.15mmø lightly and heavy galvanized wire in accord with SANS 675:2011). Also includes cost of post installation at 2,4m intervals and all related materials.	m	60.00			
3.7.6.1.2		c) Fence Type 3 .01) Construct and install 4.8m High Chain Link Fence, as per DWG INF-FEN-SD-001 . Installation Includes all Supporting Rails and Fence Fabric (mesh is produced from 2.5mmø to 3.15mmø lightly and heavy galvanized wire in accord with SANS 675:2011). Also includes cost of post installation at 2,4m intervals and all related materials.	m	144.00			
3.7.6.1.3		b) Fence Type 4 (Back Stop Fence) .01) Construct and install 2.4m High Chain Link Fence, as per DWG INF-FEN-SD-001 . Installation Includes all Supporting Rails and Fence Fabric (mesh is produced from 2.5mmø to 3.15mmø lightly and heavy galvanized wire in accord with SANS 675:2011). Also includes cost of post installation at 2,4m intervals and all related materials.	m	150.00			
3.7.6.1.4		b) Double Swing Gate .01) Construct and install 1.6 x 3.0m Wide Double Swing Gate, as per DWG INF-FEN-SD-001 . Installation Includes all Supporting Rails and Fence Fabric (mesh is produced from 2.5mmø to 3.15mmø lightly and heavy galvanized wire in accord with SANS 675:2011). Also includes cost of post installation and all related materials.	No.	5.00			
3.7.6.1.5		b) Single Swing Gate .01) Construct and install 2.4 x 1.2m Wide Swing Gate, as per DWG INF-FEN-SD-001 . Installation Includes all Supporting Rails and Fence Fabric (mesh is produced from 2.5mmø to 3.15mmø lightly and heavy galvanized wire in accord with SANS 675:2011). Also includes cost of post installation and all related materials.	No.	23.00			
3.7.7	SABS 1200 G	SOFTBALL FIELD DUGOUTS AT FIELD B&C CONCRETE SURFACE BED					
3.7.7.1	8.4	Scheduled Concrete Items					
3.7.7.1.1	8.4.1	a) Prescribed Mix Concrete .01) 20MPa / 19mm stone concrete for Surface Bed	m ³	75.00			
3.7.7.2	8.3	Scheduled Reinforcement Items					
3.7.7.2.1	8.3.1	a) High-Tensile Welded Mesh .01) Mesh Ref 255, in 50mm Cover	m ²	568.18			
3.7.7.3	8.3	Scheduled Formwork Items					
3.7.7.3.1	8.3.1	a) Smooth (Surface Bed) .01) Finishing top surfaces of concrete smooth with a power float	m ²	625.00			
3.7.8	SABS 1200	SOFTBALL FIELD ANCILLARY ITEMS AND ACCESSORIES					
3.7.8.1		a) Supply and install all Bases, Mounds, Base Plates, Paddings and all other related accessories for Field A, B & C Sundries	Sum	1.00			
3.7.8.2		Allowance for netting to pitching area	Prov Sum	1.00	R 100,000.00	R	100,000.00
3.7.8.3		Profit on item above	%	100,000.00			
SOFTBALL FIELDS (PITCH) CARRIED FORWARD TO SECTION 3 OF MAIN SUMMARY (ITEM 3.7)							

CLIENT:
TENDER NO.

CITY OF POLOKWANE
PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

SECTION 4 - MECHANICAL WORKS & INSTALLATIONS (Excluding Preliminaries and Generals)

BILLS OF QUANTITIES SECTION 4 : FIRE WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.4				
		BILL NO. 1				
		FIRE WATER				
		FIRE PROTECTION EQUIPMENT				
		Supply, deliver, Fire installation, testing, commissioning and handing over in working order and maintenance during guarantee period.				
		All in accordance with the drawings and specifications				
		FIRE PROTECTION SYSTEMS				
		Price given below shall be nett cost of equipment and materials supplied and installed on site and shall: include all neccessaary work to make a complete installation - exclude VAT				
		External				
4.1		Ø110mm Class 16 uPVC hydrant feed mains installations from Meter, including all fittings etc	m	-		
4.2		Ø100mm stortz suction hydrant, hydrant booster and check valve	No	2.00		
4.3		Supply and Install Pipe Fittings, bends, couplers, T pieces, reducers	Item	1.00		
4.2.b		Thrust blocks as required	Item	1.00		
4.4		Ø65 Instantaneous Fire hydrant complete: Fire hydrant complete with footing, all to detail	No	8.00		
4.5		Internal Hydrant cabinet and hose	No	3.00		
4.6		Trenching and backfilling for all trenches for pipes	m	200.00		
4.7		Fire Hosereel main piping: including all fittings, hangers, supports, brackets, bracing, couplings and droppers to outlets				
4.8		Ø 100 galvanized Steel	m	120.00		
4.9		Ø 50 galvanized Steel	m	40.00		
4.1		Ø 32 galvanized Steel	m	50.00		
4.11		Ø 25 galvanized Steel	m	40.00		
4.12		Supply and Install Pipe Fittings, bends, couplers, T pieces, reducers	Item	1.00		
4.13		Fire hose reel complete: Fire hose reel complete with mounting brackets, stands, valve and union and line pressure guage with proper vent cock	No	10.00		
4.14		Internal Ø65 Instantaneous Fire hydrant complete	No	3.00		
		Fire extinguishers complete with backing boards and holding clips				
4.15		- 4.5 kg DCP	No	30.00		
4.16		- 5 kg CO2	No	8.00		
4.17		Fire Blankets	No	2.00		
		<u>GROUND LEVEL COMBINED FIRE & DOMESTIC WATER STORAGE TANKS AND BOOSTER PUMP SYSTEM</u>				
4.18		<u>FIRE WATER TANK</u>				
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : FIRE WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.18.1		Supply and install sectional steel water tank constructed from square shaped standard panel size 1.22m L x 1.22m W. Tank configuration to be such that the tank is subdivided into two equal sections with a divider ±200mm below the roof of the tank. Tank Full Structure = 9.76m Long x 7.32m Wide x 4.88m high i.e., 9 panels L x 6 panels W x 4 panels H Note: Tank shop drawing to be issued to the Fire Engineer for approval prior to placement of order. All tank valves and accessories to be included in the price not necessarily limited to the following: - 2-off 750mm x 750mm access manholes on the roof of the tank - 2-off Ø200 air vents - 2-off external catladders - 2-off internal catladders - 2 x 100mm mechanical ball float valves - 2 x 125mm Overflow warning pipe outlets - 2 x Ø600mm Vortex Inhibitors - 1 x Ø100mm balancing valve (normally open) with the two sections interconnecting pipes - 2 x Ø80mm drain valves (normally closed). - 2 x 150mm tank delivery OS & Y isolating valve (normally open) on tank delivery / pump suction lines - 2 x 80mm tank Domestic Water delivery OS & Y isolating valve (normally open) on tank delivery / pump suction lines - Pump Dry run protection - 1 x Ø50mm cooling return	Sum	1.00		
4.18.2		<u>FIRE BOOSTER PUMPS</u> Supply and install pressure switch operated Diesel Duty and Electric Standby + jockey pump set complete with all standard isolating valves, strainers, non-return valves, pressure gauges etc. - Fire pump duty = 2700 Litres per minute @ 600kPa - Pump control panels and associated changeover switchgear and associated accessories - Pump performance curves to be submitted to Fire Engineer for approval. - Pump performance curves to be submitted to Fire Engineer for approval prior to procurement	Sum	1.00		
4.18.3		<u>PUMP ROOM PIPING AND ACCESSORIES</u> Supply and install all pump room interconnecting pipework complete with fittings to include all valves, flexible connections accessories not limited to the following: - 2-off non-return valves one on each pump delivery pump - 2-off isolating valves one on each pump delivery pump - 2-off site glasses with flow indicators one on each pump cooling return to tank - 2-off isolating valves one on each pump cooling return to tank downstream of the site glass - 2-off pump suction compound pressure gauge one on each pump - 2-off pump delivery pressure gauge one on each pump - 1-off isolating valve upstream of the the jockey pump - 1-off non-return valve on the jockey pump delivery - 1-off isolating valve downstream of the jockey pump non-return valve above - 1-off pump Auto-start Arrangement - 1-off Pump Room Electrical Distribution Board - 1-off Duty Electrical Motor Driven Pump Controller Panel - 1-off Electrical Jockey Pump Controller Panel - 2-off isolating valves one on the upstream and the other downstream of the direct reading flow meter - 2-off pressure gauges on either side of the of the direct reading "Gerand" or similar approved flow meter - 1 x 125mm direct reading flow meter on pump Proving Test Arrangement to tank - 1 x Pump Autostart arrangement including all standard valves, flow switches, etc - Pump Dry run protection	Sum	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : FIRE WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.19.1		- 1 x Ø50mm cooling return complete with 100 litre hydrosphere minimum, all standard isolating valves, strainers, non-return valves, pressure gauges etc. - Pump performance curves to be submitted to Fire Engineer for approval. <u>FIRE WATER TANK</u> Supply and install "Phoenix" type 1 x Nyane Ø5.98m x 7.16m H cylindrical tank (ASIB) = 201 000 litres each with the following: Nyane liner Nyane Dome roof External ladder 7.16m Internal Ladder Level indicator 125mm Overflow down pipes <u>Note:</u> Tank shop drawing to be issued to the Fire Engineer for approval prior to placement of order. All tank valves and accessories to be included in the price not necessarily limited to the following for combined dual tank system. - 2-off 750mm x 750mm access manholes on the roof of the tank - 2-off Ø200 air vents - 2-off external catladders - 2-off internal catladders - 2 x 100mm mechanical ball float valves - 2 x 125mm Overflow warning pipe outlets - 2 x Ø600mm Vortex Inhibitors - 1 x Ø100mm balancing valve (normally open) with the two sections interconnecting pipes - 2 x Ø80mm drain valves (normally closed). - 2 x 150mm tank delivery OS & Y isolating valve (normally open) on tank delivery / pump suction lines - 2 x 80mm tank Domestic Water delivery OS & Y isolating valve (normally open) on tank delivery / pump suction lines - Pump Dry run protection - 1 x Ø50mm cooling return complete with 100 litre hydrosphere minimum, all standard isolating valves, strainers, non-return valves, pressure gauges etc.	No.	2.00		
3.26		<u>FIRE BOOSTER PUMPS</u> Supply and install pressure switch operated packaged electric Duty and Standby + jockey pump set complete with all standard isolating valves, strainers, non-return valves, pressure gauges etc. - Fire pump duty = 2700 Litres per minute @ 600kPa - Pump performance curves to be submitted to Fire Engineer for approval.	Sum	1.00		
3.27		<u>PUMP ROOM PIPING AND ACCESSORIES</u> Supply and install all pump room interconnecting pipework complete with fittings to include all valves, flexible connections accessories not limited to the following: - 2-off non-return valves one on each pump delivery pump - 2-off isolating valves one on each pump delivery pump - 2-off site glasses with flow indicators one on each pump cooling return to tank - 2-off isolating valves one on each pump cooling return to tank downstream of the site glass - 2-off pump suction compound pressure gauge one on each pump - 2-off pump delivery pressure gauge one on each pump - 1-off isolating valve upstream of the the jockey pump - 1-off non-return valve on the jockey pump delivery - 1-off isolating valve downstream of the jockey pump non-return valve above - 1-off pump Auto-start Arrangement - 1-off Pump Room Electrical Distribution Board - 1-off Duty Electrical Motor Driven Pump Controller Panel - 1-off Electrical Jockey Pump Controller Panel	Sum	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : FIRE WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.20		- 2-off isolating valves one on the upstream and the other downstream of the direct reading flow meter - 2-off pressure gauges on either side of the of the direct reading "Gerand" or similar approved flow meter - 1 x 125mm direct reading flow meter on pump Proving Test Arrangement to tank EXTERNAL PIPING				
4.20.1		Ø200mm Class 16 HDPE hydrant feed mains installations from Meter, including all fittings etc	m	300.00		
4.20.2		Ø150mm Class 16 HDPE hydrant feed mains installations from Meter, including all fittings etc	m	450.00		
4.20.3		Ø100mm Class 16 HDPE hydrant feed mains installations from Meter, including all fittings etc	m	300.00		
		FIRE SIGNAGE				
4.21		Fire Equipment signage shall be Photoluminescent type.				
4.22		Hosereel/Ext signs F4 190 x 578 (Framed)	No	110.00		
4.23		Extinguisher signs F13 190 x 384 (Framed)	No	50.00		
4.24		Supply and install a jockey pump	No.	1.00		
		PROJECT ENGINEERING AND QUALITY MANAGEMENT				
4.25		Operation and Maintenance Instruction Manuals	set	4.00		
4.26		User Training	Item	1.00		
4.27		Sets of "as built" drawings "including 1 cd"	No.	6.00		
4.28		12 Months free maintenance	item	1.00		
4.29		Issuing of COC by a registered personal	Item	1.00		
		TEST & COMMISSION				
4.3		Test and Commission Floor by Floor of the Fire system	Item	1.00		
4.31		Test and Commission Entire building Fire system	Item	1.00		
4.32		Ditto but in the presence of and to the entire satisfaction of the Consulting Engineer.	Item	1.00		
FIRE WATER CARRIED FORWARD TO SECTION 4 OF MAIN SUMMARY (ITEM 4.1)						

BILLS OF QUANTITIES SECTION 4 : FIRE DETECTION AND ALARM

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.4				
		BILL NO. 2				
		FIRE DETECTION AND ALARM				
		Supply, deliver, installation, testing, commissioning and handing over in working order and maintenance during guarantee period.				
		The Contractor must study the Project Specification, Drawings, SANS standards, City of Polokwane By laws and the site carefully before submitting tenders. Contractors will be expected to submit samples with SABS Mark of Approval and obtain the relevant SABS certificates before purchasing all materials.				
		ANALOGUE ADDRESSABLE FIRE ALARM PANEL AND STANDBY BATTERIES				
4.1		Allow for the procurement, delivery, installation, connection, testing and commissioning of a two loop analogue addressable fire detection and alarm system control panel.	No.	2.00		
		BLOCKPLAN				
4.2		Provide zone diagram and associated signage, laminated and framed behind glass	No.	2.00		
		ANALOGUE ADDRESSABLE FIRE DETECTORS AND BASES				
4.3		Allow for the procurement, installation, testing and commissioning of analogue addressable smoke/fire detectors complete with base as follows:				
4.4		Optical detectors	No	64.00		
4.5		Multicriteria Detectors	No	12.00		
		ANALOGUE ADDRESSABLE MANUAL CALL POINTS				
4.6		Allow for the procurement, installation, testing and commissioning of analogue addressable manual fire alarm call points with re-settable elements	No	23.00		
		ADDRESSABLE STROBE UNITS				
4.7		Allow for the procurement, installation, testing and commissioning of analogue addressable siren/strobe units.	No	64.00		
		LINE ISOLATORS				
4.8		Allow for the procurement, installation, testing and commissioning of short circuit isolators to specification.	No	12.00		
		ADDRESSABLE OUTPUT UNIT				
4.9		Allow for the procurement, installation, testing and commissioning of analogue addressable output unit	No	2.00		
		ADDRESSABLE INPUT UNIT				
4.10		Allow for the procurement, installation, testing and commissioning of analogue addressable input unit	No	2.00		
		INTERFACE UNITS				
4.11		Allow for interface units	No.	20.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : FIRE DETECTION AND ALARM

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.12		FIRE RESISTIVE CABLING Allow for adequate PH120 cable tested to EN50200 for the fire detection system to specification.	m	10.00		
4.13		CONDUIT AND COUPLINGS Supply and installation of Ø25mm galvanized steel conduit (with necessary couplings, junction boxes, etc.) in terms of the specifications.	m	2,000.00		
4.14		JUNCTION BOXES Supply and installation of junction boxes complete with relay, terminals, glands and labelled "fire system" for interface to lift and door hold open devices	No	50.00		
4.15		FIXING DEVICES AND CONSUMABLES Allow for consumables and fixing devices for fire detection installation.	Lot	1.00		
4.16		PROJECT ENGINEERING AND QUALITY MANAGEMENT Main building (Floor by Floor), Testing, commissioning and handover of Fire Detection equipment including compilation of plans submitted to the Engineer for approval.				
4.17		Operation and Maintenance Instruction Manuals	set	4.00		
4.18		User Training	Item	1.00		
4.19		Sets of "as built" drawings "including 1 cd"	No.	6.00		
4.20		12 Months free maintenance	item	1.00		
4.21		Issuing of COC by a registered personal	Item	1.00		
4.22		TEST & COMMISSION Test and Commission Floor by Floor of the Fire detection system	Item	1.00		
4.23		Test and Commission Entire building Fire detection system	Item	1.00		
4.24		Ditto but in the presence of and to the entire satisfaction of the Consulting Engineer.	Item	1.00		
4.25		LIGHTNING PROTECTION UNITS Allow for procurement and installation of lightning protection units on the mains power supply to the panel	No.	2.00		
4.26		LOGBOOK Allow for procurement and installation of lightning protection units on the mains power supply to the panel	No.	2.00		
4.27		POWER SUPPLIES Allow for procurement, installation, testing and commissioning of power supplies complete with battery back-up.	No	1.00		
4.28		FIRE RESISTIVE CABLING Allow for adequate PH30 cable tested to EN50200 for the fire detection system to specification.	m	3,500.00		
4.29		REMRAID System Install a REMRAID System for communication with Emergency Services	No	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : FIRE DETECTION AND ALARM

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.30		CONTROL Allow for provision of project engineering, management and quality control in accordance with the conditions of contract.	Lot	1.00		
4.31		ONE YEAR'S MAINTENANCE AND GUARANTEE Allow for one year's maintenance and guarantee in accordance with specifications.	Lot	1.00		
4.32		TESTING, COMMISSIONING AND HANDOVER Allow for all factors required for the testing, commissioning and handover of the fire detection system as specified.	Lot	1.00		
4.33		DOCUMENTATION Provision of 4 sets of documentation to be handed to client for the building all in compliance with specification and relevant codes of practice to include the compilation and submission of 4 No. Operation & Maintenance procedures for the Fire Detection and Alarm system; "as built" drawings in hardcopies and electronic format.	Item	4.00		
4.34		TRAINING Allowance of a full day's training of operators for the end-user client on the operation of the entire system.	Lot	1.00		
FIRE DETECTION AND ALARM CARRIED FORWARD TO SECTION 4 OF MAIN SUMMARY (ITEM 4.2)						

BILLS OF QUANTITIES SECTION 4 : EMERGENCY EVACUATION SYSTEM

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.4				
		BILL NO. 3				
		PUBLIC ADDRESS AND VOICE EVACUATION INSTALLATION				
		Supply, deliver, installation, testing, commissioning and handing over in working order and maintenance during guarantee period.				
3.1		VOICE EVACUATION HEAD-END & SPEAKERS - FIELD A				
3.1.1		Voice Evacuation Frame	No	2.00		
3.1.2		Digital Power Amplifier Module 500W	No	5.00		
3.1.3		Emergency Power Supply	No	1.00		
3.1.4		Remote Microphone	No	1.00		
3.1.5		Remote Microphone Extension	No	1.00		
3.1.6		Ceiling Speaker 5inch 6W,EN54	No	54.00		
3.1.7		Wall Speaker Black - Certified BS & EN54-24	No	50.00		
3.1.8		Horn Speaker - Certified BS & EN54-24	No	20.00		
3.1.9		BLACK 60W (92 Db) 65 20, 000 Hz --- Wall weatherproof, EN	No	12.00		
3.1.10		Equipment Rack Complete	No	1.00		
3.1.11		LABOUR FOR RACK WORK	No	16.00		
3.1.12		LABOUR FOR PROGRAMMING/SETUP/COMM	No	4.00		
3.1.13		FIRE RATED CABLING (PH30) Allow for adequate cabling for the wiring of the emergency evacuation system to specification. (1.5mm2)	m	4,500.00		
3.1.14		CONDUIT AND COUPLINGS Allow for the procurement and installation of galvanized steel conduit (with necessary couplings, junction boxes, etc.) in terms of the specifications.25 mm diameter	m	3,500.00		
3.1.15		SPRAGUE AND ACCESSORIES Provide the necessary steel Sprague and accessories for the project.	Lot	1.00		
3.1.16		CONSUMABLES Allow for consumable items used in installation of emergency evacuation system.	Lot	1.00		
3.1.17		LABOUR FOR RACK WORK	No	24.00		
3.1.18		LABOUR FOR PROGRAMMING/SETUP/COMM	No	6.00		
3.1.19		LABOUR FOR PROGRAMMING/SETUP/COMM ON SITE	No	16.00		
3.1.20		TRAINING	Sum	1.00		
3.1.21		MANAGEMENT AND CONTROL	Sum	1.00		
EMERGENCY EVACUATION SYSTEM CARRIED FORWARD TO SECTION 4 OF MAIN SUMMARY (ITEM 4.3)						

BILLS OF QUANTITIES SECTION 4 : DOMESTIC WATER

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.4				
		BILL NO. 4				
		DOMESTIC WATER				
4.1		Pump Room and External				
4.1.1		Duty and standby preconnected electrical cold water supply pump set complete with minimum 100 litre pressure vessel, electrical control panel, isolating and check valves, 3-way motorised water flow control valve. Pump Duty: 4.5 ls-1 @ 350kPa	No	1		
4.1.2		Supply and install, Ø100mm medium quality galvanised steel cold water tank suction and delivery piping.	m	120		
4.1.3		Supply and install Ø75mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	100		
4.1.4		Supply and install Ø63mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	100		
4.1.5		Supply and install Ø50mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	100		
4.1.6		Supply and install Ø40mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	150		
4.1.7		Supply and install Ø32mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	100		
4.1.8		Supply and install Ø25mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	140		
4.1.9		Supply and install Ø20mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	50		
4.1.10		Supply and install Ø16mm Geberit Mepla pipes including PVDF pipe fittings and supports along the running lengths	m	120		
4.2		VALVES				
4.2.1		Supply and install isolating ball valves, Ø80mm	No	6		
4.2.2		Supply and install isolating ball valves, Ø50mm	No	6		
4.2.3		Supply and install isolating ball valves, Ø40mm	No	8		
4.2.4		Supply and install isolating ball valves, Ø32mm	No	12		
4.2.5		Supply and install isolating ball valves, Ø25mm	No	12		
4.2.5		Supply and install stopcocks / angle valves on wash basins, and WCs	No	60		
4.3		HOT WATER GENERATION				
4.3.1		300 Litre integrated domestic water heat pump c/w cold air discharge connection and air terminal	No	3		
4.3.2		200 Litre integrated domestic water heat pump c/w cold air discharge connection and air terminal	No	1		
4.3.3		150 Litre integrated domestic water heat pump c/w cold air discharge connection and air terminal	No	1		
4.3.4		300 litre electrical water heater	No	1		
4.3.5		150 litre electrical water heater	No	1		
DOMESTIC WATER CARRIED FORWARD TO SECTION 4 OF MAIN SUMMARY (ITEM 4.4)						

BILLS OF QUANTITIES SECTION 4 : SANITARY DRAINAGE

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.4				
		BILL NO. 5				
		SANITARY DRAINAGE				
4.1		Pipes (PVC Soil & Waste)				
4.1.1		Ø110mm pipes including pipe couplings and supports along the running length	m	180.00		
4.1.2		Ø75mm pipes including pipe couplings and supports along the running length	m	100.00		
4.1.3		Ø63mm pipes including pipe couplings and supports along the running length	m	100.00		
4.1.4		Ø50mm pipes including pipe couplings and supports along the running length	m	240.00		
4.1.5		Ø40mm pipes including pipe couplings and supports along the running length	m	100.00		
4.2		FITTINGS				
		Bends				
4.2.1		110mm PVC 30° bend	No	30.00		
4.2.2		110mm PVC 45° bend	No	24.00		
4.2.3		110mm PVC 88.5° bend	No	45.00		
4.2.4		110mm PVC 90° segment bend	No	18.00		
4.2.5		110mm x 63mm PVC 90°, reduced with leg	No	15.00		
4.2.5		110mm x 56mm PVC 90°, reduced with leg	No	15.00		
		Branch fittings				
		110mm PVC branch fitting 45°	No	40.00		
		110mm PVC branch fitting 88.5° swept entry	No	30.00		
		110mm PVC double branch fitting 45°	No	30.00		
		110mm PVC breeches branch fitting 2 x 90°	No	15.00		
		110mm x 75mm reducer eccentric, long	No	20.00		
		110mm x 63mm reducer eccentric, long	No	15.00		
		110mm x 56mm reducer eccentric, long	No	20.00		
		110mm Geberit (or equivalent) HDPE access pipe 90° with oval service opening	No	50.00		
4.3		CONNECTIONS				
		Welding Joints				
4.3.1		110mm PVC electrofusion coupling		30.00		
4.3.2		110mm PVC adaptor clamping connector		60.00		
		Adaptors				
4.3.3		110mm PVC straight adaptor to stoneware		60.00		
4.4		WASTE FITTINGS				
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : SANITARY DRAINAGE

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
		Connection Bends				
4.4.1		110mm PVC connection bend 88.5° with lateral supplementary connections		20.00		
4.4.2		110mm PVC connection bend 90° for wall hung WC with extension		40.00		
4.4.3		110mm PVC double connection bend 90°		20.00		
		Straight Connectors				
		110mm PVC straight connector with ring seal socket		60.00		
		P-Traps				
4.4.4		63mm PVC P-Trap		20.00		
		<u>Extra over 50 mm pipes for:</u>				
4.4.5		Bend	No	10.00		
4.4.6		Bend with cleaning eye	No	24.00		
4.4.7		Junction with cleaning eye	No	30.00		
4.4.8		Vent Fitting with Cowl	No	40.00		
4.4.9		Butyl resealing P-trap	No	72.00		
4.4.8		Two way vent valves	No	20.00		
4.5		ACCESSORIES				
		Air Admittance Valves				
4.4.1		PVC air admittance valve GRB90 for PVC		15.00		
4.4.2		PVC air admittance valve GRB50 for PVC		15.00		
4.4.3		110mm Two Way Vent Valve		20.00		
SANITARY DRAINAGE CARRIED FORWARD TO SECTION 4 OF MAIN SUMMARY (ITEM 4.5)						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		BILL NO. 6				
		HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)				
SYSTEM 1		SECOND FLOOR				
4.1		OUTDOOR AIR-TO-AIR CONDENSING UNIT				
		61,7 kW (Cooling capacity) Heat Recovery condensing unit	No	1.00		
4.2		INDOOR UNITS				
4.2.1		14 kW inverter type MSP ducted air conditioning unit	No	1.00		
4.2.1.1		11.2 kW inverter type MSP ducted air conditioning unit	No	1.00		
4.2.2		2.2 inverter type VRV 4 Way Cassette	No	6.00		
4.2.3		3.6 inverter type VRV 4 Way Cassette	No	1.00		
4.2.3.1		4.5 inverter type VRV 4 Way Cassette	No	4.00		
		MODE CONTROL UNIT				
4.2.4		-Heat Recovery Mode Control Unit suitable for ≤ 6 indoor units	No	1.00		
4.3		CONTROL UNITS				
		Infrared individual remote control units	No	5.00		
4.4		INSULATED REFRIGERANT PIPING INCL. Y-JOINT PIPE FITTING & ACCESSORIES				
4.4.1		9.52 Liquid copper tubing	m	55.00		
4.4.2		15.88mm Gas copper tubing	m	55.00		
4.5		GALVANISED STEEL LOW PRESSURE SUPPLY AIR DUCTING (externally insulated)				
4.5.1		400mm x 300mm ducting	m	100.00		
4.5.2		Ø250mm spiral steel ducting	m	60.00		
4.5.3		Ø250mm flexible ducting	m	22.50		
4.6		GALVANISED STEEL LOW PRESSURE FRESH AIR DUCTING				
4.4.1		300mm x 300mm ducting	m	45.00		
4.4.2		Ø300mm spiral steel ducting	m	22.50		
4.7		AIR TERMINAL UNITS				
4.4.1		1200mm x 600mm return air grille	No	5.00		
4.4.2		600mm x 600mm constant volume ceiling diffuser with Ø250mm neck. Neck total pressure = 50 Pa.	No	15.00		
4.8		PVC CONDENSATE PIPING				
		Ø32mm PVC piping	m	40.00		
SYSTEM 2		FIRST FLOOR				
4.9		OUTDOOR AIR-TO-AIR CONDENSING UNIT				
		67.2 kW (Cooling Capacity) Heat Recovery condensing unit	No	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.10		INDOOR AIR CONDITIONING UNITS				
4.10.1		11.2 kW inverter type MSP ducted air conditioning unit	No	4.00		
4.10.2		3.6 inverter type VRV 4 Way Cassette	No	6.00		
4.10.3		3.6 kW Split Unit (Standby)	No	1.00		
		MODE CONTROL UNIT				
4.10.4		-Heat Recovery Mode Control Unit suitable for ≤ 6 indoor units	No	1.00		
4.11		CONTROL UNITS				
		Infrared individual remote control units	No	5.00		
4.12		INSULATED REFRIGERANT PIPING INCL. Y-JOINT PIPE FITTING & ACCESSORIES				
4.12.1		9.52 Liquid copper tubing	m	55.00		
4.12.2		15.88mm Gas copper tubing	m	55.00		
4.13		GALVANISED STEEL LOW PRESSURE SUPPLY AIR DUCTING (externally insulated)				
4.13.1		400mm x 300mm ducting	m	100.00		
4.13.2		Ø250mm spiral steel ducting	m	60.00		
4.13.3		Ø250mm flexible ducting	m	22.50		
4.14		GALVANISED STEEL LOW PRESSURE FRESH AIR DUCTING				
4.14.1		300mm x 300mm ducting	m	45.00		
4.14.2		Ø300mm spiral steel ducting	m	22.50		
4.15		AIR TERMINAL UNITS				
4.15.1		1200mm x 600mm return air grille	No	5.00		
4.15.2		600mm x 600mm constant volume ceiling diffuser with Ø250mm neck. Neck total pressure = 50 Pa.	No	15.00		
4.16		PVC CONDENSATE PIPING				
		Ø32mm PVC piping	m	40.00		
SYSTEM 3		GROUND- NORTH WING				
4.17		OUTDOOR AIR-TO-AIR CONDENSING UNIT				
		78.6kW (Cooling Capacity) Heat Recovery condensing unit	No	1.00		
4.18		INDOOR UNITS				
		DINING				
		CEILING CASSETTE INVERTER AIR CONDITIONING UNITS				
4.18.1		-11.2kW inverter type 360° air conditioning unit c/w accessories	No	2.00		
		OFFICE				
4.18.1.1		6.0 inverter type VRV 4 Way Cassette	No	3.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.18.2		Supply and install a 2.2kW nominal cooling capacity Heat Recovery Wind-Free 4-Way cassette indoor unit complete with panel, and related control wiring. Nominal Heating Capacity: 2.5kW Power Input: 18W Fan Air Flow Rate: 130 L/s MEETING ROOM/MEDICAL & OFFICES	No	1.00		
4.19.3		Supply and install a 2.8kW nominal cooling capacity Heat Recovery Wind-Free 4-Way cassette indoor unit complete with panel, and related control wiring. OFFICE	No	4.00		
4.18.4		Supply and install a 2.2kW nominal cooling capacity Heat Recovery Wind-Free 4-Way cassette indoor unit complete with panel, and related control wiring. Nominal Heating Capacity: 2.5kW Power Input: 18W Fan Air Flow Rate: 130 L/s MODE CONTROL UNIT	No	1.00		
4.18.5		Heat Recovery Mode Control Unit suitable for ≤ 6 indoor units as specified by the Supplier	No	1.00		
4.19		CONTROL UNITS Wired touch controller	No	1.00		
4.20		INSULATED REFRIGERANT PIPING INCL. Y-JOINT PIPE FITTING & ACCESSORIES				
4.20.1		-6.35mm Liquid copper tubing	m	50.00		
4.20.2		-12.7mm Gas copper tubing	m	50.00		
4.21		PVC CONDENSATE PIPING -Ø32mm PVC piping	m	40.00		
4.22		GALVANISED STEEL LOW PRESSURE FRESH AIR DUCTING (externally insulated)				
4.22.1		550mm x 300mm ducting	m	45.00		
4.22.2		200mm x 200mm ducting	m	46.00		
4.22.3		Ø150mm spiral steel ducting	m	47.00		
4.22.4		Ø150mm flexible ducting	m	48.00		
4.23		DX SPLIT UNIT AIR CONDITIONING SPLIT CEILING CASSETTE INVERTER AIR CONDITIONING UNITS OFFICE				
4.23.1		Supply and install, test and commission a 2.2kW nominal cooling inverter type 4-Way blow air conditioning unit c/w panel, outdoor condensing unit, fixing accessories, electrical control wiring, insulated copper refrigerant piping and Ø25mm condensate drain piping not more than 8m long. Nominal Air Flow Rate: 136 L/s Power Supply: 1Ø/220-240V/50Hz.	No	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.23.2		MEDICAL AND PHYSIO Supply and install, test and commission a 5.2kW nominal cooling inverter type 4-Way blow air conditioning unit c/w panel, outdoor condensing unit, fixing accessories, electrical control wiring, insulated copper refrigerant piping and Ø25mm condensate drain piping not more than 8m long. Nominal Air Flow Rate: 150L/s Power Supply: 1Ø/220-240V/50Hz.	No	2.00		
4.24		DRESSING ROOM VENTILATION				
4.24.1		Supply, install, test and commission wall mounted, built in reversible air extract fan similar or equal to "Vortice Vario" model: 300/12" c/w automatic shutters. Air Flow Rate: 135l/s Current: 0.41A Power Input: 70-90W Power Supply: 1Ø/220-240V/50Hz.	No	1.00		
4.24.2		Supply and install wall mounted (built-in) natural anodised aluminium grilles 450mm Wide x 250mm wide. Air intake flow rate: 135 L/s Pressure drop: 20 Pa Face Velocity: 2m/s	No	2.00		
SYSTEM 4		GROUND FLOOR- SOUTH WING				
4.25		OUTDOOR AIR-TO-AIR CONDENSING UNIT 33.6kW (Cooling Capacity) Heat Recovery condensing unit	No	1.00		
4.26		INDOOR UNITS				
		INTERVIEW ROOM				
		HIDE AWAY INVERTER AIR CONDITIONING UNITS				
4.26.1		11.2 kW inverter type MSP ducted air conditioning unit	No	2.00		
		RECEPTION				
4.26.2		Supply and install a 2.2kW nominal cooling capacity Heat Recovery Wind-Free 4-Way cassette indoor unit complete with panel, and related control wiring. Nominal Heating Capacity: 2.5kW Power Input: 18W Fan Air Flow Rate: 130 L/s	No	1.00		
		MEETING ROOM				
4.26.3		Supply and install a 2.8kW nominal cooling capacity Heat Recovery Wind-Free 4-Way cassette indoor unit complete with panel, and related control wiring. Nominal Heating Capacity: 3.2kW Power Input: 18W Fan Air Flow Rate: 140 L/s	No	1.00		
		OFFICE				
4.26.4		Supply and install a 2.2kW nominal cooling capacity Heat Recovery Wind-Free 4-Way cassette indoor unit complete with panel, and related control wiring. Nominal Heating Capacity: 2.5kW Power Input: 18W Fan Air Flow Rate: 130 L/s	No	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.27		MODE CONTROL UNIT				
		-Heat Recovery Mode Control Unit suitable for ≤ 6 indoor units	No	1.00		
4.28		CONTROL UNITS				
		Wired touch controller	No	3.00		
4.29		INSULATED REFRIGERANT PIPING INCL. Y-JOINT PIPE FITTING & ACCESSORIES				
4.29.1		6.35mm Liquid copper tubing	m	50.00		
4.29.2		12.7mm Gas copper tubing	m	50.00		
4.30		PVC CONDENSATE PIPING				
		Ø32mm PVC piping	m	40.00		
4.31		GALVANISED STEEL LOW PRESSURE FRESH AIR DUCTING (externally insulated)				
4.31.1		550mm x 300mm ducting	m	45.00		
4.31.2		200mm x 200mm ducting	m	50.00		
4.31.3		Ø150mm spiral steel ducting	m	21.00		
4.31.4		Ø150mm flexible ducting	m	15.00		
4.32		DX SPLIT UNIT AIR CONDITIONING				
		OFFICE				
4.32.1		Supply and install, test and commission a 5.2 kW nominal cooling inverter type 4-Way blow air conditioning unit c/w panel, outdoor condensing unit, fixing accessories, electrical control wiring, insulated copper refrigerant piping and Ø25mm condensate drain piping not more than 8m long. Nominal Air Flow Rate: 136 L/s Power Supply: 1Ø/220-240V/50Hz.	No	1.00		
4.32.2		MEDICAL AND PHYSIO Supply and install, test and commission a 5.2kW nominal cooling inverter type 4-Way blow air conditioning unit c/w panel, outdoor condensing unit, fixing accessories, electrical control wiring, insulated copper refrigerant piping and Ø25mm condensate drain piping not more than 8m long. Nominal Air Flow Rate: 150L/s Power Supply: 1Ø/220-240V/50Hz.	No	1.00		
4.34		DRESSING ROOM VENTILATION				
4.34.1		Supply, install, test and commission wall mounted, built in reversible air extract fan similar or equal to "Vortice Vario" model: 300/12" c/w automatic shutters. Air Flow Rate:175 L/s Current: 0.41A Power Input: 70-90W Power Supply: 1Ø/220-240V/50Hz.	No	1.00		
4.34.2		Supply and install wall mounted (built-in) natural anodised aluminium grilles 450mm Wide x 250mm wide. Air intake flow rate: 135 L/s Pressure drop: 20 Pa Face Velocity: 2m/s	No	2.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.35.1		FRESH AIR SUPPLY VERTICAL SYSTEM Supply, install, test and commission a fresh air intake axial flow fan located on the roof pumping air down to levels 2, 1 and 0. Fan to be fitted complete with 2 x 1.5D sound attenuators (with pods); one located on the air intake side and the other on the air delivery side of the fan; fitted with 2 x mating flanges, 2 x mounting feet, 4 x anti-vibration mounts. Fan size: Ø630 Air flow rate: 3.5m ³ /s Total Pressure: 315Pa Power Input: 1.45kW Power Supply: 3Ø/50Hz Sound Pressure: 70(dB)	Set	1.00		
4.36		UNINSULATED FRESH AIR SUPPLY GALVANISED STEEL DUCTING 700mm W x 600mm D low pressure galvanised steel ducting	m	12.00		
4.37		FIRE DAMPERS				
4.34.1		Supply and install, 600mm W x 500mm D fire dampers	ea	1.00		
4.34.2		Supply and install, 600mm W x 400mm D fire dampers	ea	1.00		
4.34.3		Supply and install, 500mm W x 300mm D fire dampers	ea	1.00		
4.34.4		Supply and install, 400mm W x 300mm D fire dampers	ea	2.00		
		TOILET VENTILATION SYSTEMS				
SYSTEM 1						
4.38		PLAYERS ABLUTIONS (NORTH WING)				
4.38.1		TOILET EXHAUST FAN ARRANGEMENT Supply, install, test and commission a toilet exhaust air manually adjustable axial flow fan located in the ceiling void. Fan to be fitted complete with 2 x 1.5D sound attenuators (with pods); one located on the air suction side and the other on the air expulsion side of the fan; fitted with 2 x mating flanges, 2 x mounting feet, 4 x anti-vibration mounts. Fan size: Ø500 Air flow rate: 1.1m ³ /s Total Pressure: 170Pa Power Input: 0.29kW Power Supply: 1Ø/50Hz Sound Pressure: 71(dB) Actuation: Occupancy Sensor	Set	1.00		
4.39		GALVANISED STEEL DUCTING				
4.39.1		Supply and install, 500mm W x 350mm D ducting	m	12.00		
4.39.2		Supply and install, 200mm W x 300mm D ducting	m	24.00		
4.39.3		Supply and install Ø200mm spigots	m	22.00		
4.39.4		Supply and install Ø200mm spiral ducting	m	55.00		
4.40		EUROFLEXFLEXIBLE DUCTING Supply and install Ø200mm flexible ducting	m	50.00		
4.41		AIR EXTRACT TERMINALS				
4.41.1		Supply and install Ø200mm metallic disc valves	ea	22.00		
4.41.2		Supply and install, 550 W x 450mm D anodised aluminium door grilles	ea	3.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
SYSTEM 2						
		<u>TOILET VENTILATION SYSTEMS</u>				
		PUBLIC ABLUTIONS (NORTH WING)				
4.42		TOILET EXHAUST FAN ARRANGEMENT				
		Supply, install, test and commission a toilet exhaust air manually adjustable axial flow fan located in the ceiling void. Fan to be fitted complete with 2 x 1.5D sound attenuators (with pods); one located on the air suction side and the other on the air expulsion side of the fan; fitted with 2 x mating flanges, 2 x mounting feet, 4 x anti-vibration mounts. Fan size: Ø500 Air flow rate: 0.7m ³ /s Total Pressure: 110Pa Power Input: 0.13kW Power Supply: 1Ø/50Hz Sound Pressure: 58(dB) Actuation: Occupancy Sensor	Set	1.00		
4.43		GALVANISED STEEL DUCTING				
4.43.1		Supply and install, 500mm W x 300mm D ducting	m	12.00		
4.43.2		Supply and install, 200mm W x 300mm D ducting	m	18.00		
4.43.3		Supply and install Ø200mm spigots	m	12.00		
4.43.4		Supply and install Ø200mm spiral ducting	m	40.00		
4.44		EUROFLEXFLEXIBLE DUCTING				
		Supply and install Ø200mm flexible ducting	m	25.00		
4.45		AIR TERMINALS				
4.45.1		Supply and install Ø200mm metallic disc valves	ea	12.00		
4.45.2		Supply and install, 550 W x 450mm D anodised aluminium door grilles	ea	3.00		
SYSTEM 3						
		PLAYERS ABLUTIONS (SOUTH WING)				
4.46		TOILET EXHAUST FAN ARRANGEMENT				
4.44.1		Supply, install, test and commission a toilet exhaust air manually adjustable axial flow fan located in the ceiling void. Fan to be fitted complete with 2 x 1.5D sound attenuators (with pods); one located on the air suction side and the other on the air expulsion side of the fan; fitted with 2 x mating flanges, 2 x mounting feet, 4 x anti-vibration mounts. Fan size: Ø500 Air flow rate: 1.1m ³ /s Total Pressure: 170Pa Power Input: 0.29kW Power Supply: 1Ø/50Hz Sound Pressure: 71(dB) Actuation: Occupancy Sensor	Set	1.00		
4.47		GALVANISED STEEL DUCTING				
4.44.1		Supply and install, 500mm W x 350mm D ducting	m	12.00		
4.44.2		Supply and install, 200mm W x 300mm D ducting	m	24.00		
4.44.3		Supply and install Ø200mm spigots	m	22.00		
4.44.4		Supply and install Ø200mm spiral ducting	m	55.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.48		EUROFLEXFLEXIBLE DUCTING				
		Supply and install Ø200mm flexible ducting	m	50.00		
4.49		AIR TERMINALS				
4.49.1		Supply and install Ø200mm metallic disc valves	ea	22.00		
4.49.2		Supply and install, 550 W x 450mm D anodised aluminium door grilles	ea	3.00		
SYSTEM 4		PUBLIC ABLUTIONS (SOUTH WING)				
4.50		TOILET EXHAUST FAN ARRANGEMENT				
4.50.1		Supply, install, test and commission a toilet exhaust air manually adjustable axial flow fan located in the ceiling void. Fan to be fitted complete with 2 x 1.5D sound attenuators (with pods); one located on the air suction side and the other on the air expulsion side of the fan; fitted with 2 x mating flanges, 2 x mounting feet, 4 x anti-vibration mounts. Fan size: Ø500 Air flow rate: 0.7m ³ /s Total Pressure: 110Pa Power Input: 0.13kW Power Supply: 1Ø/50Hz Sound Pressure: 58(dB) Actuation: Occupancy Sensor	Set	1.00		
4.51		GALVANISED STEEL DUCTING				
4.51.1		Supply and install, 500mm W x 300mm D ducting	m	12.00		
4.51.2		Supply and install, 200mm W x 300mm D ducting	m	18.00		
4.51.3		Supply and install Ø200mm spigots	m	12.00		
4.51.4		Supply and install Ø200mm spiral ducting	m	40.00		
4.52		EUROFLEXFLEXIBLE DUCTING				
		Supply and install Ø200mm flexible ducting	m	25.00		
4.53		AIR TERMINALS				
4.53.1		Supply and install Ø200mm metallic disc valves	ea	12.00		
4.53.2		Supply and install, 550 W x 450mm D anodised aluminium door grilles	ea	3.00		
4.54		REFRIGERATION				
4.54.1		Allow for specialist installation of evaporator, compressor, insulation and controls for the cold store.	ea	1.00		
4.54.2		Allow for specialist installation of evaporator, compressor, insulation and controls for the dry store.	ea	1.00		
4.55		KITCHEN AIR EXTRACT CANOPY				
		Allow for specialist installation of a mechanical kitchen air extract canopy.	ea	1.00		
4.56		SPECIALIST FITTINGS				
		Allow for specialist fittings and fixtures	Sum	1.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 4 : HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
4.56		SHOP DRAWINGS				
		Production of hardcopy and electronic workshop drawings for review and approval before commencement of all the HVAC works.	Item	1.00		
4.57		TESTING AND COMMISSIONING				
		Perform all required testing and commissioning including the issuing of required certificates	Item	1.00		
4.58		OPERATION & MAINTENANCE MANUALS				
		Compilation of Operation and Maintenance Manuals and drawings four (4) sets hard copy and 1 copy electronic format.	Item	1.00		
4.59		MAINTENANCE LIABILITY				
		Guarantee of installation as well as an installation maintenance for a twelve (12) months period.	Item	1.00		
4.60		TRAINING OF END-USER CLIENT STAFF				
		Training of End-user staff on the complete functioning of the entire HAVC system and components	Item	1.00		
4.70		Allow for two hundred and fifty thousand Rands (R250 000) for the supply and installation of cold room	Psum	-		
4.59		MAINTENANCE LIABILITY				
		Guarantee of installation as well as an installation maintenance for a twelve (12) months period.	Item	1.00		
4.60		TRAINING OF END-USER CLIENT STAFF				
		Training of End-user staff on the complete functioning of the entire HVAC system and components	Item	1.00		
HEATING, VENTILLATION, AIR-CONDITIONING SYSTEM (HVAC) CARRIED FORWARD TO SECTION 4 OF MAIN SUMMARY (ITEM 4.6)						

BILLS OF QUANTITIES SECTION 4 : LIFT INSTALLATION

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.4				
		BILL NO. 7				
		LIFT INSTALLATION				
		The lift installation shall adhere to the relevant part of the Standard SANS 1545, EN81-20, EN81-70-2003 and all construction shall comply with the latest requirements of the Occupational Safety Act 85 -1993 as amended. This bill of quantities shall be read in conjunction with the lift drawing and or specifications together with the structural, architectural and electrical discipline drawings and specifications.				
4.1		Supply and install, test and commission minimum 1000kg machineroomless passenger lift with three (3) stops-in line. The Lift shall be installed complete with controls, car, lighting and all accessories and shall be tested, commissioned, and left in good operating condition. Lift car size will be 1100 mm wide x 2100 mm deep x 2200 mm high, landing doors to be 900 mm wide x 2100mm high and of brushed stainless-steel type. Interior will be brushed stainless steel with handrails, with artificial stone flooring and sport lights for lighting.The lift shall fit in a vertical masonry shaft of rough opening 2000mm Wide x 2480mm Deep. The lift shall be equipped with centre opening doors with a fire 2 hour fire rating in accordance with the local fire regulations. This includes all material, equipment, labour and transportation as well as the twelve months guarantee period.	No.	1		
		Power Supply: 3 Phase, 400V, 50Hz Machine output: ± 6kW Starting Current: ±30 A Nnominal current: 22A Floor to floor height: ±3400 Travel Distance: less than 14m Shaft depth: 1500mm Rated Speed: 1 m/s				
4.2		Lift Sump Pump with all accessories (0,8l/s @ 60kPa)	Item	1		
4.3		Production of electronic workshop drawings once structural drawings have been issued and issuing for approval before commencement of works.	Item	1		
4.4		Perform all required inspections and tests as required by the Occupational Health and Safety Act, No 85 of1993, and as described in SABS1545 and SABS1543, including the issuing of the required Certificates				
4.5		Compilation of Operation and Maintenance Manuals and drawings four (4) sets hard copy and 1 copy electronic format.	Item	1		
4.6		Maintenance for a twelve (12) months period	Item	1		
4.7		Allow for Preliminary and Generals	Item	1		
LIFT INSTALLATION CARRIED FORWARD TO SECTION 4 OF MAIN SUMMARY (ITEM 4.7)						

CLIENT:
TENDER NO.

CITY OF POLOKWANE
PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

SECTION 5 - ELECTRICAL WORKS & INSTALLATIONS (Excluding Preliminaries and Generals)

BILLS OF QUANTITIES SECTION 5 : DISTRIBUTION BOARD

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 1				
		DISTRIBUTION BOARD				
		Tenderers are referred to the project specification for full description of materials, etc. to be used. All work shall be done strictly in accordance with specifications and manufacturer's instructions and to be left in perfect working order after completion.				
5.1		<u>Distribution Boards</u>				
		Distribution Boards fitted complete with equipment, wired as per Schematic Diagram. Install as shown of drawings.				
5.1.1		Distribution Board DB G1	ea	1.00		
5.1.2		Distribution Board DB G2	ea	1.00		
5.1.3		Distribution Board DB F1	ea	1.00		
5.1.4		Distribution Board DB F2	ea	1.00		
5.1.5		Distribution Board STANDBY DB	ea	1.00		
5.1.6		Distribution Board UPS DB	ea	1.00		
5.1.7		Distribution Board UPS DB1	ea	1.00		
5.1.8		Distribution Board UPS DB2	ea	1.00		
5.1.9		Kiosk 1	ea	1.00		
5.1.10		Kiosk 2	ea	1.00		
5.1.11		Kiosk 3	ea	1.00		
5.1.12		Kiosk 4	ea	1.00		
5.1.13		Kiosk 5	ea	1.00		
5.1.14		Kiosk 6	ea	1.00		
5.1.15		Main LV Board	ea	1.00		
DISTRIBUTION BOARD CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.1)						

BILLS OF QUANTITIES SECTION 5 : MEDIUM VOLTAGE (MV) EQUIPMENT AND INSTALLATION

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 2				
		MEDIUM VOLTAGE (MV) EQUIPMENT AND INSTALLATION				
		Manufacture, Supply, Delivery ,installation ,connection, testing, commissioning and handover of accessories (where applicable connection to existing equipment) General and Detailed specification, drawings and applicable schedule to be read together with this Bill.				
5.1		<u>Municipal 11kV Switchgear Equipemnt</u>				
		Premset, Compact Modular Vacuum Switchgear with shieldded Solid Insulation System 17.5 (11)kV rated (95kV BIL) ,630A Aluminium 25kA 3s Busbar, IAC : 25kA 1s Rated, IP3X, Bottom Vent				
5.1.1		DO6H- 630A Feeders complete with ARU CTs and Easegy P3 Protection Relay	ea	2.00		
5.1.2		I06H-Incomer Isolators	ea	2.00		
5.1.3		Premset Accessories as follows; Operating handle, premset instruction guide in English, PS100 backup power supply of 24 Volt DC and PS100 battery of 38Ah.	Sum	1.00		
5.2		<u>Softball 11kV Switchgear Equipment</u>				
		Premset, Compact Modular Vacuum Switchgear with shieldded Solid Insulation System 17.5 (11)kV rated (95kV BIL) ,630A Aluminium 25kA 3s Busbar, IAC : 25kA 1s Rated, IP3X, Bottom Vent				
5.5.1		D06H-630A Incomer complete with ARU CTs,VRU1 VTs, PM5100 Meter and Easergy P3 Protection Relay	ea	2.00		
5.5.2		DO6H- 630A Feeders Complete with ARU CTs and Easergy P3 Protection Relay	ea	4.00		
5.5.3		DO6H-Bus-Section	ea	1.00		
5.5.4		G06-Riser	ea	1.00		
5.5.5		Premset Accessories as follows; Operating handle, premset instruction guide in English, PS100 backup power supply of 24 Volt DC and PS100 battery of 38Ah.	sum	1.00		
5.3		<u>Softball 11000/400V Transformer Room Equipment & Mini-Substations</u>				
5.5.1		500kVA 11000/420kVA Type B Mini-Sub including an SF6, ABBRMCCV12ESK WIC 1-2 Ring Main Unit	RATE ONLY	1.00		
5.5.2		2500kVA 11kV/400V Dyn11 6% impedance dry-type transformer, Trihal Transformer or other Approved	ea	2.00		
5.5		<u>Control and LV Cabling</u>				
		Supply and Install all required 600/1000 V PVC/SWA power and control cables including termination at both ends, glands, core identification, etc to provide a complete functional substation				
5.5.1		1KV SWA Cu ECC 4C x35mm²	m	80.00		
5.5.2		1KV SWA Cu 4C x6mm²	m	60.00		
5.5.3		1KV SWA Cu 2C x6mm²	m	40.00		
5.6		<u>11kV Supply Cable</u>				
Carried Forward						

BILLS OF QUANTITIES SECTION 5 : MEDIUM VOLTAGE (MV) EQUIPMENT AND INSTALLATION

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
5.6.1		Supply and Install in ground, 3 Core Cables from Existing Ring to the Proposed Municipal Substation, from the Municipality Substation to the Softball Substation, From the Softball Substation to the Transformer Room and from the Softball Substation to the 2 x 500kVA Mini-substations 11/11kV MV PILC Copper 3 Core x 95 mm ² DSTA Table 18	m	450.00		
5.6.2		Supply and install termination for the following cables including shear off lugged bimetal connection to the panel including connection to the panel complete 11kV MV PILC Copper 3 Core x 95 mm ² DSTA (Table 18)	ea	8.00		
5.6.4		Supply and Install joints for following cables including shear off ferrules bimetal complete 11kV MV PILC Copper 3 Core x 95 mm ² DSTA Table 18	m	4.00		
5.7		Test and commission of MV Cables after jointing and termination prior to connection to Panel as per Section 3 of MV cables	sum	1.00		
5.7		<u>Earthing</u> Supply and install a complete earthing system for the 11kV Substation in accordance with the requirements of the earthing specialist The following Allowance shall be made for material and installation and shall be inclusive of joints and terminations				
5.7.1		Copperweld Rods 1.5m	ea	16.00		
5.7.2		10mm ² round Cu Earth Conductor	m	240.00		
5.7.3		70mm ² green PVC insulated stranded Copper Earth Conductor	m	20.00		
5.7.4		800 x 50 x 10mm Copper Earth mat/bar	m	4.00		
5.7.5		Other Material and Labour required to complete the earthing installation as required not included above (List and Quote separately)				
5.7.6		Soil Resistivity Test and Issuing of Certificate	sum	1.00		
5.7.7		Testing of Earth after completion and Issuing of Certificate	sum	1.00		
5.8		<u>Excavations and Trenches</u> Excavation , Supply of bedding , backfilling, compaction including removal of spoil for the following				
5.8.1		600mm wide x 800mm deep for power cables	m	200.00		
5.8.2		300mm wide x 600mm deep for earth mat	m	80.00		
5.8.3		400mm wide x 600mm deep for control cable	m	80.00		
5.9		<u>Substation Accessories</u> Supply and install the following official labels notices as instructed by the Engineer				
5.9.1		Type 1: Combined Notes (Unauthorised Entrance , first Aid, fire and Danger)	ea	4.00		
5.9.2		Type 2: Combined Notes (Unauthorised Entrance and Danger)	ea	4.00		
5.9.3		Type 3: Danger	ea	4.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 5 : MEDIUM VOLTAGE (MV) EQUIPMENT AND INSTALLATION

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R	C
Brought forward							
5.9.4		Type 4 : Name Plate (Municipal Substation & Softball Substation)	ea	4.00			
5.9.5		Supply and Install First Aid Kit	ea	2.00			
5.9.6		Supply and Install Substation Table	ea	2.00			
5.9.7		Portable Notices	ea	2.00			
5.9.8		Supply and Install tool rack	ea	2.00			
5.9.9		Summation metering					
5.9.9.1		Design, install and commission a summation unit complete an "Elstar" meter A1700 (CT controlled) including summation current transformers, suitable, wiring labels and suitable cubical for meters	ea	1.00			
5.1		<u>Galvanized Cable Trays and Supports</u> Supply and install all required cable trays and cable supports for all cabling required between all equipment trenches for the complete installation based on the tenders particular equipment					
5.10.1		100mm Wide Cable Tray	m	200.00			
5.10.2		450mm Wide Cable Tray	m	250.00			
5.10.3		Municipality Connection Fee & Deposit (50kVA 3-Phase Construction Power)	Prov. Sum	1.00	R 50,000.00	R	50,000.00
5.10.4		Allow for profit on item above if required	%	50,000.00			
MEDIUM VOLTAGE (MV) EQUIPMENT AND INSTALLATION CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.2)							

BILLS OF QUANTITIES SECTION 5 : LOW VOLTAGE (LV) EQUIPMENT AND INSTALLATION

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 3				
		LOW VOLTAGE (LV) EQUIPMENT AND INSTALLATION				
		Tenderers are referred to the project specification for full description of materials, etc. to be used. All work shall be done strictly in accordance with specifications and manufacturer's instructions and to be left in perfect working order after completion.				
5.1		<u>1000 kVA Generator</u>				
		Supply, installation, testing and commissioning of 1 X 1100kVA generator complete with a Synchronization Panel as per the specifications by specialised supplier.				
5.1.1		CATERPILLAR C32 – 1100KVA OPEN SET:	ea	1		
5.1.2		Sound attenuated Container	ea	1		
5.1.3		External Diesel Tank 4500l	ea	1		
5.1.4		Delivery	sum	1		
5.1.5		Maintenance & Service Period of 1 Year	sum	1		
5.1.6		Testing & Commissioning	sum	1		
5.1.7		Issue Maintenance Manuals (4 Copies)	sum	1		
5.2		<u>200kVA UPS with Battery backup 30 mins</u>				
5.2.1		200kVA UPS complete with Battery backup 30 min	ea	1		
5.2.2		Testing & Commissioning	sum	1		
5.2.3		Issue Maintenance Manuals (4 Copies)	sum	1		
5.2.4		Maintenance & Service Period of 1 Year	sum	1		
LOW VOLTAGE (LV) EQUIPMENT AND INSTALLATION CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.3)						

BILLS OF QUANTITIES SECTION 5 : CABLING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
5.4		SECTION NO.5 BILL NO. 5 CABLING <u>Site Low Voltage Cabling</u> Supply and install PVC/ SWA/ PVC copper laid in trenches (trenching and backfilling measured elsewhere), draw into risers and sleeves and terminals.				
5.4.1		185mm ² x 4C PVC SWA ECC	m	350.00		
5.4.2		120mm ² x 4C PVC SWA ECC	m	300.00		
5.4.3		95mm ² x 4C PVC SWA ECC	m	1,600.00		
5.4.4		70mm ² x 4C PVC SWA ECC	m	450.00		
5.4.5		50mm ² x 4C PVC SWA ECC	m	400.00		
5.4.6		35mm ² x 4C PVC SWA ECC	m	250.00		
5.4.7		25mm ² x 4C PVC SWA ECC	m	200.00		
5.4.8		16mm ² x 4C PVC SWA ECC	m	1,800.00		
5.4.9		16mm ² x 2C PVC SWA ECC	m	60.00		
5.4.10		10mm ² x 4C PVC SWA ECC	m	30.00		
5.4.11		10mm ² x 2C PVC SWA ECC	m	20.00		
5.4.12		6mm ² x 4C PVC SWA ECC	m	35.00		
5.4.13		6mm ² x 2C PVC SWA ECC	m	20.00		
5.4.14		4mm ² x 4C PVC SWA ECC	m	40.00		
5.4.15		4mm ² x 2C PVC SWA ECC	m	220.00		
5.4.16		2,5mm ² x 2C PVC SWA ECC	m	85.00		
		<u>Termination of PVC/ SWA/ PVC Copper Cables</u>				
5.4.17		150mm ² x 4C PVC SWA ECC	ea	10.00		
5.4.18		95mm ² x 4C PVC SWA ECC	ea	32.00		
5.4.19		70mm ² x 4C PVC SWA ECC	ea	6.00		
5.4.20		50mm ² x 4C PVC SWA ECC	ea	4.00		
5.4.21		35mm ² x 4C PVC SWA ECC	ea	6.00		
5.4.22		25mm ² x 4C PVC SWA ECC	ea	10.00		
5.4.23		16mm ² x 4C PVC SWA ECC	ea	15.00		
5.4.24		16mm ² x 2C PVC SWA ECC	ea	15.00		
5.4.25		10mm ² x 4C PVC SWA ECC	ea	10.00		
5.4.26		10mm ² x 2C PVC SWA ECC	ea	15.00		
		6mm ² x 4C PVC SWA ECC	ea	2.00		
5.4.28		6mm ² x 2C PVC SWA ECC	ea			
5.4.29		4mm ² x 4C PVC SWA ECC	ea	2.00		
Carried Forward						

BILLS OF QUANTITIES SECTION 5 : CABLING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
5.4.30		4mm ² x 2C PVC SWA ECC	ea	14.00		
5.4.31		2,5mm ² x 2C PVC SWA ECC	ea	40.00		
EARTH CONDUCTORS						
5.4.32		185mm ² x 4C PVC SWA ECC	m	350.00		
5.4.33		120mm ² x 4C PVC SWA ECC	m	300.00		
5.4.34		95mm ² x 4C PVC SWA ECC	m	1,600.00		
5.4.35		70mm ² x 4C PVC SWA ECC	m	450.00		
5.4.36		50mm ² x 4C PVC SWA ECC	m	500.00		
5.4.37		35mm ² x 4C PVC SWA ECC	m	250.00		
5.4.38		25mm ² x 4C PVC SWA ECC	m	200.00		
5.4.39		16mm ² x 4C PVC SWA ECC	m	1,800.00		
5.4.40		16mm ² x 2C PVC SWA ECC	m	250.00		
5.4.41		10mm ² x 4C PVC SWA ECC	m	95.00		
5.4.42		10mm ² x 2C PVC SWA ECC	m	20.00		
5.4.43		6mm ² x 4C PVC SWA ECC	m	35.00		
5.4.44		6mm ² x 2C PVC SWA ECC	m	20.00		
5.4.45		4mm ² x 4C PVC SWA ECC	m	40.00		
5.4.46		4mm ² x 2C PVC SWA ECC	m	220.00		
5.4.47		2,5mm ² x 2C PVC SWA ECC	m	85.00		
EARTH TERMINATIONS						
5.4.48		185mm ² x 4C PVC SWA ECC	ea	10.00		
5.4.49		120mm ² x 4C PVC SWA ECC	ea	8.00		
5.4.50		95mm ² x 4C PVC SWA ECC	ea	32.00		
5.4.51		70mm ² x 4C PVC SWA ECC	ea	4.00		
5.4.52		50mm ² x 4C PVC SWA ECC	ea	6.00		
5.4.53		35mm ² x 4C PVC SWA ECC	ea	10.00		
5.4.54		25mm ² x 4C PVC SWA ECC	ea	15.00		
5.4.55		16mm ² x 4C PVC SWA ECC	ea	15.00		
5.4.56		16mm ² x 2C PVC SWA ECC	ea	10.00		
5.4.57		10mm ² x 4C PVC SWA ECC	ea	15.00		
5.4.58		10mm ² x 2C PVC SWA ECC	ea	2.00		
5.4.59		6mm ² x 4C PVC SWA ECC	ea			
5.4.60		6mm ² x 2C PVC SWA ECC	ea	2.00		
5.4.61		4mm ² x 4C PVC SWA ECC	ea	40.00		
5.4.62		4mm ² x 2C PVC SWA ECC	ea	220.00		
CABLING CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.4)						

BILLS OF QUANTITIES SECTION 5 : EXCAVATIONS (ELECTRICAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 5				
		EXCAVATIONS (ELECTRICAL)				
5.1		<u>Excavation, etc.</u> "Soft Excavations" for trenching and including backfilling compacting and danger tape.				
5.1.1		Cable or sleeves trenches soft not exceeding 1m deep.	m	1,600.00		
5.1.2		Cable or sleeves trenches hard not exceeding 1m deep.	m	500.00		
5.1.3		Cable or sleeves trenches hard rock not exceeding 1m deep.	m	250.00		
5.2		<u>Sleeves</u> Unplasticised polyvinyl chloride (UPVC) sleeve piping including short lengths and joining, laid in trench (trench and backfilling measured elsewhere).				
5.2.1		110mm Diameter Sleeve with draw wire.	m	1,500.00		
5.3		<u>Warning Tape</u>				
5.3.1		Cable warning tape placed 150mm above cable in excavations.	m	800.00		
5.4		<u>Manhole</u>				
5.4.1		covers	ea	21.00		
EXCAVATIONS (ELECTRICAL) CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.5)						

BILLS OF QUANTITIES SECTION 5 : LUMINAIRES

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 6				
5.1		LUMINAIRES				
		<u>Luminaires</u>				
		Luminaires complete as specified and indicated in schedule of luminaires supplied and fitted as described to structure or ceilings, including lamps, tubes, connections, brackets.				
5.1.1		Reference B	ea	138.00		
5.1.2		Reference B1	ea	117.00		
5.1.3		Reference DL	ea	289.00		
5.1.4		Reference D	ea	168.00		
5.1.5		Reference F6	ea	89.00		
5.1.6		Reference F3	ea	45.00		
5.1.7		Reference F4	ea	162.00		
5.1.8		Reference G	ea	160.00		
5.1.9		Reference S1/S2	ea	65.00		
5.1.10		Reference BL1	ea	35.00		
5.1.11		Reference X	ea	10.00		
5.1.12		Reference B6	ea	252.00		
5.1.11		Reference CB	ea	16.00		
5.1.12		Reference UP1	ea	24.00		
5.1.13		Reference CB 1	ea	-		
LUMINAIRES CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.6)						

BILLS OF QUANTITIES SECTION 5 : STADIUM LIGHTING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 7				
		STADIUM LIGHTING				
		The following work to be carried out by a lighting specialist and to include warranty and guarantee for Supply , Delivery assembly and erection of Mast complete with fittings, Mobile Crane for assembly and erection of mast, Electrical Material, in Mast concrete foundation to the satisfactory of the Engineer and Earthing by an Earthing Specialist including a Stadium Lighting Control technology				
5.1		<u>Main Field A</u>				
5.1.1		Beka Schreder Omniblast-3-E 1480C ENB RA1P or other approved	ea	24.00		
5.1.2		Beka Schreder Omniblast-3-E 1480C NB RA1P or other approved	ea	22.00		
5.1.3		Beka Schreder Omniblast-3-E 1370C 5188 RA1P or other approved	ea	54.00		
		<u>Masts Field A</u>				
5.1,4		30M Mast to house 12 x Omniblast 3 (Field A)	ea	2.00		
5.1,5		20M Mast to house 11 x mniblast 3 (Field A)	ea	2.00		
		<u>Aiming of floodlights</u>				
5.1,6		Field A	Sum	1.00		
5.2		<u>Field B</u>				
5.2,1		Beka Schreder Omniblast-3-E 1480C ENB RA1P or other approved	ea	24.00		
5.2,2		Beka Schreder Omniblast-3-E 1480C NB RA1P or other approved	ea	22.00		
5.2,3		Beka Schreder Omniblast-3-E 1370C 5188 RA1P or other approved	ea	54.00		
		<u>Masts Field B</u>				
5.2,4		30M Mast to house 12 x Omniblast 3 (Field B)	ea	2.00		
5.2,5		20M Mast to house 11 x mniblast 3 (Field B)	ea	2.00		
		<u>Aiming of floodlights</u>				
5.2,6		Field B	Sum	1.00		
5.3		<u>Field C</u>				
5.3,1		Beka Schreder Omniblast-3-E 1480C ENB RA1P or other approved	ea	24.00		
5.3,2		Beka Schreder Omniblast-3-E 1480C NB RA1P or other approved	ea	22.00		
5.3,3		Beka Schreder Omniblast-3-E 1370C 5188 RA1P or other approved	ea	54.00		
		<u>Masts Field C</u>				
5.4.1		30M Mast to house 12 x Omniblast 3 (Field C)	ea	2.00		
5.4.2		20M Mast to house 11 x mniblast 3 (Field C)	ea	2.00		
5.5		<u>Aiming of floodlights</u>				
5.5.1		Field C	Sum	1.00		
5.6		<u>Extra Over Rates</u>				
		Excavation in :				
5.6.1		Pickable Soil	m³	1.00		
Carried Forward						

Brought forward						
5.6.2		Soft Rock	m³	1.00		
5.6.3		Hard Rock	m³	1.00		
		Carrying out the following :				
5.6.4		Blinding	m³	1.00		
5.6.5		Imported Backfill	m³	1.00		
5.6.6		reinforcing steel	t	1.00		
5.6.7		Blasting	m³	1.00		
STADIUM LIGHTING CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.7)						

BILLS OF QUANTITIES SECTION 5 : POWER AND LIGHTING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 8				
		POWER AND LIGHTING				
		Power & Lighting				
		<u>Conduits (Power)</u>				
		Rigid PVC conduit including bends, draw boxes with covers, etc. fixed.				
5.1		20mm Diameter conduit	m	3,000.00		
5.2		25mm Diameter conduit	m	2,700.00		
		Galvanised steel flexible conduit with PVC sheath				
5.3		20mm Diameter 1000mm long complete with connectors at both ends (Geyser/stoves).	ea	80.00		
		<u>Socket Outlets Boxes</u>				
		Galvanised outlet box and cover plate to suit any number, size or type of entries, fixed onto conduit.				
5.4		100 x 100 x 50mm Deep Box.	ea	156.00		
		<u>Conductors</u>				
		PVC insulated stranded copper conductor drawn into conduit including terminations and connections.				
5.5		2,5mm ² Conductor	m	15,000.00		
5.6		4,0mm ² Conductor	m	7,500.00		
5.7		6,0mm ² Conductor	m	4,000.00		
		Switched socket outlets, etc., complete with cover plate fixed in flush box type.				
5.8		16A Three-pin single switched socket outlet wall mounted.	ea	205.00		
5.9		60A Double pole isolators Geysers/ Air Conditioner/Stove	ea	43.00		
		<u>Powerskirting</u>				
5.1		Supply and install hot dip galvanised epoxy powder coated Two Cover, three compartment powerskirting complete with covers. All fixing to concrete or brick wall, internal joiner splices and other sundries to be included for.	m	100.00		
5.11		16A Three pin dedicated switch socket outlet install on powerskirting	ea	65.00		
5.12		90 bends	ea	12.00		
5.13		End caps	ea	10.00		
		<u>Conduits Lighting</u>				
		Rigid PVC conduit including bends, draw boxes with covers, etc. fixed.				
5.14		20mm Diameter Conduit	m	4,800.00		
		<u>Light Switch Outlet Boxes</u>				
		Galvanised outlet box and cover plate, to suit any number, size or type or entries, fixed onto conduit.				
Carried Forward						

BILLS OF QUANTITIES SECTION 5 : POWER AND LIGHTING

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
Brought forward						
5.15		50 x 100 x 50mm deep box	ea	275.00		
5.16		60mm Diameter shallow type box	ea	300.00		
5.17		60mm Diameter deep type box	ea	250.00		
		<u>Conductors</u>				
		PVC insulated stranded copper conductor drawn into conduit including terminations and connections.				
5.18		1,5mm ² conductor	m	8,000.00		
5.19		1,5mm ² 3core Captyre complete with 5 Amp plug top	m	250.00		
		Light switches complete with cover plate fixed in flush box type.				
5.2		16A Single lever one-way switch	ea	70.00		
5.21		16A Two-lever Two-way switch	ea	60.00		
5.22		5 Amp round socket outlet	ea	235.00		
5.23		20A Photo-electric daylight-sensitive switch complete as specified.	ea	15.00		
5.24		500w dimmer switch	ea	6.00		
		<u>Other</u>				
5.25		P9000 Galvanised Trunking including brackets and mounting bolts	m	260.00		
5.26		100mm Galvanised cable tray	m	130.00		
POWER AND LIGHTING CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.8)						

BILLS OF QUANTITIES SECTION 5 : NETWORK INFRASTRUCTURE

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 9				
		NETWORK INFRASTRUCTURE				
5.9		<u>Network Infrastructure</u>				
5.9.1		Network Switches				
5.9.1.1		24 Port Core Switch	ea	4.00		
5.9.1.2		24 Port POE Switch	ea	8.00		
5.9.1.3		8 Port Industrial switch with Power supply	ea	8.00		
5.9.1.4		SFP Modules	ea	20.00		
5.9.2		Cables				
5.9.2.1		Fibre Optic Cable, 4 Core SM	m	6,000.00		
5.9.2.2		Cat6 Cable	m	4,500.00		
5.9.2.3		Network Rack 12U Wall Mounted with fibre patch panel and accessories	ea	2.00		
5.9.2.4		Network Rack 6U Wall Mounted with fibre patch panel and accessories	ea	2.00		
5.9.2.5		Outdoor IP65 Enclosure	ea	8.00		
5.9.2.6		P9000 Trunking with Cover	ea	200.00		
5.9.2.7		Galvanised Conduit and accessories, 25mm	ea	2,000.00		
NETWORK INFRASTRUCTURE CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.9)						

BILLS OF QUANTITIES SECTION 5 : INTRUDER DETECTION / ACCESS CONTROL

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 10				
		INTRUDER DETECTION / ACCESS CONTROL				
		SPECIALIST INSTALLATION				
5.10		<u>Access Control</u>				
5.10.1		3 Arm Turnstile for Pedestrian Entrances	ea	6.00		
		<i>The tenderer must render a complete solution as required per drawings, BOM and the specifications.</i>				
5.10.2		Impro IPS boxed solution includes cluster controller (No LCD), with one Wiegand reader module (supports 2 readers). IPS box has space for 3 additional modules (108 I/O modules or additional Wiegand modules) c/w Batteries	ea	10.00		
5.10.3		Impro MDR: Impro non-keypad multi-discipline reader (MDR) with buzzer, tri-coloured LED and 10 way terminal block for easy installation	ea	40.00		
5.10.4		Dorma Light Duty Door Closer 60 KG	ea	25.00		
5.10.5		Green Break Glass Unit c/w Accessories	ea	25.00		
5.10.6		Maglock c/w L&Z Bracket, Battery Charger & Battery	ea	25.00		
5.10.7		DELL Vostro Desktop 3910, 12th Gen Intel(R) Core(TM) i5-12400 processor (6-Core 18M Cache, 2.5GHz to 4.4GHz), 4GB, 4Gx1, DDR4, 3200MHz UDIMM Non-ECC; up to 64GB (additional memory sold separately), 1TB 7200RPM 3.5" SATA HDD, Tray load. DVD Drive (Reads and Writes to DVD/CD), , Windows 11 Pro, English, Dutch, French, German, Italian , Intel® UHD Graphics, Dell USB Optical Mouse-MS116 - Black / Dell Entry Keyboard KB216 Black , US International (QWERTY), , Intel(R) Wi-Fi 6 2x2 (Gig+)	ea	1.00		
5.10.8		Philips Monitor 23,8" IPS Panel, 1920x1080 @ 75hz, VGA, HDMI, Cables incl, LowBlue, Flicker-Free	ea	2.00		
5.10.9		Impro Access Portal Pro License	ea	1.00		
5.10.10		Nitgen Hamster II USB enrolment reader	ea	1.00		
5.10.11		Fargo DTC1250e, Base Model, Single Sided, USB + Full Colour YMCKO Cartridge, 250 images + AsureID 7 Solo, Basic Card Production software + AsureID 7 Express, Card Production Software, unlimited records + DTC Cleaning Kit	ea	1.00		
5.10.12		Impro Credit card ISO print quality + Twinprox Portrait Holder + Plain Flat Lanyard Royal Blue	ea	150.00		
5.10.13		9U Wallbox, Swing Frame, 600mm Deep, Black c/w All Accessories	ea	4.00		
5.10.14		IFS Economy 24-port Fast Ethernet Websmart Switch with 802.3at PoE+ and 2-port Gigabit TP SFP combo ports (370W PoE Budget)	ea	5.00		
5.10.15		Eaton 5E 2000i, Interactive UPS , USB 2000 VA / 1200 W c/w All Accessories	ea	3.00		
5.10.16		APC Surge Module for CAT6 or CAT5/5e Network Line PoE Systems, Replaceable, 1U	ea	40.00		
5.10.17		IFS 8-port PoE Unmanaged Industrial Ethernet Switch with 2 x RJ45/SFP Gigabit uplink combo ports & 48Vdc 240W Single Output Industrial DIN Rail Power Supply	ea	1.00		
5.10.18		4.5m VELOCITY SPIKE BARRIER - electrical - steel ramping -with 4.5m LED octagonal barrier arm - Polyester exterior grade powder coat - blue / white + Ground loop 3m x 0.75m cut into roadway + Car gooseneck - Polyester exterior grade powder coat - white + Gooseneck raincover (150 x 150 x 100mm deep) - Polyester exterior grade powder coat - white	ea	4.00		
Carried Forward						

CLIENT:
TENDER NO.

CITY OF POLOKWANE
PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

Brought forward					
5.10.19		Alu-Mylar 4pr x 0.22mm OAM Grey	ea	1,500.00	
5.10.20		Sundries	Sum	1.00	
5.10.21		Testing and Comissioning	Sum	1.00	
INTRUDER DETECTION / ACCESS CONTROL CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.10)					

BILLS OF QUANTITIES SECTION 5 : CCTV

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
5.11		SECTION NO.5 BILL NO. 11 CCTV SPECIALIST INSTALLATION CCTV <i>The tenderer must render a complete solution as required per drawings, BOM and the specifications.</i>				
5.11.1		TruVision M Series 2MP, H.265+, Smart IP Dome Camera, 30 m IR, 2.8 mm lens, H.265+, grey	ea	45.00		
5.11.2		TruVision M Series 2MP, H.265+, Smart IP Bullet Camera, 60 m IR, motorized zoom lens 2.8 to 12 mm lens, grey	ea	30.00		
5.11.3		TruVision Pole Mount Adaptor	ea	20.00		
5.11.4		APC Standalone Surge Protector for 10/100/1000 Base - T Ethernet Lines or PoE network system	ea	20.00		
5.11.5		TruVision M Series 4MP IP PTZ camera, H.265+, 150m IR, 25x zoom, PoE+/24VAC	ea	12.00		
5.11.6		8m Pole For PTZ Camera	ea	12.00		
5.11.7		APC Standalone Surge Protector for 10/100/1000 Base - T Ethernet Lines or PoE network system	ea	12.00		
5.11.8		30W Midspan Single port midspan for Power over Ethernet Plus (PoE+) IEEE 802.3at	ea	10.00		
5.11.9		TruVision ANPR camera, H.264, 1080p, 8-32mm, Super Low Light, WDR, true D/N, 80m IR, Audio, Alarm, BNC, micro SD/SHDC slot, Intelligence, PoE+ (802.3-at) /12VDC, IP66	ea	4.00		
5.11.10		APC Standalone Surge Protector for 10/100/1000 Base - T Ethernet Lines or PoE network system	ea	2.00		
5.11.11		Rack mount Windows NVR, I7 processor, 16GB RAM, 2 X Video o.p ports, Windows 11 Pro-64bit, 1 x 250GB SSD. Excludes HDD's	ea	2.00		
5.11.12		Surveillance Hard Drive - 8TByte	ea	4.00		
5.11.13		CathexisVision PROFESSIONAL I.P Video Management Suite Professional Recording and Video Management Software. Max 150 cams per site (Unlimited servers). 7 Simultaneous Viewing Clients (upgradeable to 10)	ea	1.00		
5.11.14		CathexisVision Professional camera license Professional camera license.	ea	86.00		
5.11.15		Cathexis Version Migration license 2018.1	ea	86.00		
5.11.16		Impro portal bundled license	ea	1.00		
5.11.17		DELL OPTIPLEX 7090 MT, 10th Generation Intel Core i7-10700 (8-Core, 16MB Cache, 2.9GHz to 4.8GHz, 65W), 16GB (2x8GB) DDR4 non ECC memory DDR4 2666MHz UDIMM Non-ECC 4 Slots Max 128GB, M.2 512GB PCIe NVMe Class 40 Solid State Drive, 8x DVD+/-RW 9.5mm Optical Disk Drive, Onboard Sound, Windows 10 Pro (64bit) English, Integrated Intel® HD Graphics 630, Dell Optical Mouse-MS116 - Black Dell Entry Keyboard KB216 Black , US International (QWERTY), No Modem, RJ-45 port 10/100/1000 Mbps (rear), Dell SupportAssist OS Recovery Tool; Dell Optimizer; Dell SupportAssist, 3Y ProSupport	ea	1.00		
5.11.18		Video wall license	ea	1.00		
5.11.19		Operators keyboard with LCD display and joystick	ea	1.00		
5.11.20		MECER 43" FHD LED PANEL & Wall Mounting Bracket 34-63"	ea	2.00		
5.11.21		Philips Monitor 23,8" IPS Panel, 1920x1080 @ 75hz, VGA, HDMI, Cables incl, LowBlue, Flicker-Free	ea	2.00		
Carried Forward						

CLIENT:

CITY OF POLOKWANE

TENDER NO.

PM47/2023

ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

Brought forward						
5.11.22		42U 19" Assembled Rack, 1000mm Deep, Black, Clear Glass Door with Lock, 4 220V Fans, 2 Shelve Rack With All Accessories	ea	1.00		
5.11.23		IFS 24-Port 10/100/1000Base-T IEEE802.3at Copper Ports with 4 shared SFP Slots Managed Gigabit Ethernet Switch (24x 15.4W/ 12 x 30.8 W / 380W PoE Budget) and Static Routing (0~50?)	ea	1.00		
5.11.24		SE EASY UPS SRV 3000VA, 2400W ONLINE 230V & Easy UPS 1Ph on-line rail kit 900 mm	ea	1.00		
5.11.25		Cat 6e Full Copper UTP Foiled Solid - Grey	ea	9,000.00		
5.11.26		Sundries	Sum	1.00		
		Testing and Comissioning	Sum	1.00		
CCTV CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.11)						

BILLS OF QUANTITIES SECTION 5 : PROVISIONAL SUMS (ELECTRICAL)

ITEM NO	PAYMENT ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT R C
		SECTION NO.5				
		BILL NO. 12				
		PROVISIONAL SUMS (ELECTRICAL)				
		SPECIALIST INSTALLATION				
		The following provisional sums and prime cost amount are NETT COST of the work described. The contractor shall not be entitled to any discount, percentage or allowance what so ever on the value of any provisional sum or prime cost amount other the priced value for profit and attendance as provided for. The provisional sums and prime cost amounts may be deducted in whole or in part from the contract and are subject to adjustment upon completion				
		In general specialist installations envisaged will be of the following, but not limited thereto; Neon/ Digital Score Board and / or Display and Telephony and IT				
		PROVISIONAL SUMS FOR NOMINATED/SELECTED SUBCONTRACT WORKS				
5.1		Neon/ Digital Score Board and / or Display				
5.1.1		Provide the Provisional Sum of R 130 000 for supply and installation of Digital Score Board and/ or Display by subcontractor	Prov Sum	1.00	R 130,000.00	R 130,000.00
5.1.2		Allow for profit if required	%	130,000.00		
5.1.3		Allow for attending to subcontractor	%	130,000.00		
5.2		<u>BROADCASTING PTZ CAMERAS</u>				
5.2.1		Provide the Provisional Sum of R 300 000 for supply and installation of Broadcasting PTZ Cameras, including wiring, testing and commissioning in accordance with the specifications provided by the Representative/Agent and to be adjusted in accordance with schedule rates on completion	Prov Sum	1.00	R 300,000.00	R 300,000.00
5.2.2		Allow for profit if required	%	300,000.00		
5.2.3		Allow for attending to subcontractor	%	300,000.00		
5.3		<u>Municipal Connection Fee</u>				
5.3.1		Provide the Provisional Sum of R 200 000 for council connection fee, in accordance with the specifications provided by the Representative/Agent and to be adjusted in accordance with schedule rates on completion	Prov Sum	1.00	R 200,000.00	R 200,000.00
5.3.2		Allow for profit if required	%	200,000.00		
5.3.3		Provide the Provisional Sum of R 40 000 for Protection Specialist to conduct Protection Grading and Commissioning of the entire Medium Voltage Switchgear	Prov. Sum	1.00	40,000.00	R 40,000.00
5.3.4		Allow for profit if required	%	40,000.00		
5.3.5		Provide the Provisional Sum of R 30 000 for the cost of a competent person to conduct inspection to all temporal Electrical Installations once a month for the duration of the contract	Prov. Sum	1.00	30,000.00	R 30,000.00
5.3.6		Allow for profit if required	%	30,000.00		
PROVISIONAL SUMS (ELECTRICAL) CARRIED FORWARD TO SECTION 5 OF MAIN SUMMARY (ITEM 5.12)						

PART C3: SCOPE OF WORK

C3.1: DESCRIPTION OF WORKS

C3.2: LIST OF DRAWINGS

C3.3: PROCUREMENT

C3.4: CONSTRUCTION

C3.5: VARIATION AND ADDITIONS TO STANDARD SPECIFICATIONS

C3.6: PARTICULAR SPECIFICATIONS –

C3.7: HEALTH AND SAFETY SPECIFICATIONS

C3.8: ENVIRONMENTAL MANAGEMENT SPECIFICATIONS

C3.9: MANAGEMENT OF WORKS

POLOKWANE MUNICIPALITY

PROJECT DESCRIPTION : ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

C3: SCOPE OF WORK

C3.1 STANDARD SPECIFICATIONS

C3.2 PROJECT SPECIFICATIONS

PART A: GENERAL

PS-1	Project Description
PS-2	Description of the Site and Access
PS-3	Details of the Works
PS-4	Construction Management Requirements
PS-5	Security Clearance of Personnel
PS-6	Subcontractors
PS-7	Supply of Materials
PS-8	Execution of Works

PART B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

PSA	SABS 1200 A: General
PSC	SABS 1200 D: Earthworks

C3.3 PARTICULAR SPECIFICATIONS

SECTION PC	Trimming Of Site
SECTION PC	Maintenance
SECTION PE	Contingencies
SECTION PG	Generic Labour-Intensive Specification
SECTION POHS	
OHS 1993	Safety Specification

POLOKWANE MUNICIPALITY

PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

C3 Scope of Work

As much as is economically feasible all work shall be implemented by employing Labour Intensive Construction methods. Over and above the normal Building and Allied works to be implemented by employing skilled and unskilled labour the works specified in the “Guidelines for the Implementation of Labour-Intensive Infrastructure Projects under the Expanded Public Works Programme (EPWP)” shall be undertaken using Labour Intensive Construction methods

1 DESCRIPTION OF THE WORKS

1.1 Employer’s objectives

The client’s objective is to construct a Softball stadium that meets international standards. The facilities should be multi-purpose in order to function as a sports stadium, high performance Centre, conference facility and family events & entertainment venue. The new development will be known as the New Polokwane Softball Stadium.

The Proposed Softball Stadium will be a combination of sports ground (softball fields and training tracks), recreational facilities (shop and family entertainment) and administrative functions (offices and conference facilities).

The proposed scope of work will entail the supply of material and construction of the following:

Labour-intensive works

Labour-intensive works shall be constructed/maintained using local workers who are temporarily employed in terms of this Scope of Work.

Labour-intensive competencies of supervisory and management staff

Contractors shall engage supervisory and management staff in labour-intensive works that have completed the skills programme including Foremen/Supervisors at NQF “National Certificate: Supervision of Civil Engineering Construction Processes” and Site Agent/Manager at NQF level 5 “Manage labour-intensive Construction Processes” or equivalent QCTO qualifications.

1.2 Overview of the works

The work will be carried using Labour- Intensive approach as much as possible. Labour-intensive works comprise the activities described in SANS 1921-5, Earthworks activities which are to be

performed by hand, and its associated specification data. Such works shall be Constructed using local workers who are temporarily employed in terms of this Scope of Work.

1.3 Extent of the works

The construction of ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE which includes the following:

1. Associated Facilities & infrastructure for the whole stadium

- Grandstand Building (with facilities for visiting and home teams, administration, media, VIP, storage, ancillary spaces, ramps, staircases, part circulation spaces and ablutions.
- Ablution facilities for all Fields(A, B, C and practice field) located in the Grand stand Building
- Electrical, Mechanical and Fire prevention works.
- Sewer collection and reticulation works, water supply and reticulation works.
- Roadworks for entry and exit to site, internal and circulation road works and parking.
- Public plaza works.
- Landscaping to spaces around the Grand Stand, Stand B and the public plaza.
- Secured Kids Play Area

2. Main Field A

- Field A Grand Stand with roof (3500 seating)
- Field A , 6260m2 (International Standard) with netting and safety requirements as per manual
- Earth Berm (Future seating), Dugouts, Bullpens and batting cages
- Lighting and electronic requirements as per client specification

3. Field B

- Field B (Area 6260m2) (International Standard)
- Field B seating Stand (1000 spectators)
- Earth Berm, Steel Structure Pavilion, Bullpens and batting cages
- Lighting and electronic requirements as per client specification
- Field C
- Field C (Area 6260m2) prepared for match standards and conditions.

4. Practice Field

- Open grassed area practice field of area 8250m2 (75m x 110m).
- Of the above certain works have been partially constructed
- Piling is completed
- Earthworks partially completed with mainly the extra layers for field A still outstanding
- Sewer pipework is about 90% complete and the manholes are outstanding and testing thereof
- Water pipework is about 80% with sprinkler pipework still outstanding
- Stormwater pipework is about 90% with most junction boxes brickwork built in
- Fields layers of G5 are 70% in situ with a balance of about 1000mm layer in field A
- The Grandstand;

Though they will be some remedial works required encompassing the demolishing of part of the first floor walkway reinforced concrete slab, some reinforced beams, all the reinforced concrete steps and brick walls to concrete steps, approximately 65% of the concrete structure is cast. The first and second floor walkways are cast, the first rise of stepped seating concrete

structure is cast. Most of the racking beams steel has been fixed and about 25% have concrete cast in. The second floor slab is in situ.

1.4 Location of the Works

The project is located in the Limpopo province, approximately 2.5km from Polokwane City and next to Peter Mokaba Stadium. The project lies on erf 688-LS between Burger Street, Suid Street, Magazyn Street. The proposed works are portrayed in the image below highlighting the Softball Stadium Area. The coordinates are 23°55'11.29"S and 29°28'2.93"E.

C3.1 STANDARD SPECIFICATIONS

The standard specifications on which this contract is based are:

SABS 1200 A 1986	:	General
SABS 1200 C 1980 (Amended 1982)	:	Site Clearance
SABS 1200 D 1989	:	Earthworks
SABS 1200 DB 1989	:	Earthworks (Pipe Trenches)
SABS 1200 DM 1989	:	Earthworks (roads, subgrades)
SABS 1200 G 1982	:	Concrete (structural)
SABS 1200 GA 1982	:	Concrete (Small Works)
SABS 1200 L 1983	:	Medium pressure pipelines
SABS 1200 LB 1983	:	Bedding (Pipes)
SABS 1200 LD 1982	:	Sewers
SABS 1200 LE 1982	:	stormwater drainage
SABS 1200 LF 1983	:	Erf connections (water)
SABS 1200 ME 1981	:	Subbase
SABS 1200 MF 1981	:	Base
SABS 1200 MG 1996	:	Bituminous surface treatment
SABS 1200 MH 1996	:	Asphalt base and surfacing
SABS 1200 MJ 1984	:	Segmented paving
SABS 1200 MM 1984	:	Ancillary roadworks
SABS 1200 MK 1983	:	Kerbing and channelling

(Note: "SABS" has been changed to "SANS"; the SABS 1200 specifications are due to be replaced in the foreseeable future by SANS 1200)

The following SANS specifications are also referred to in this document and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria:

SANS 1921 – 1 (2004): Construction and Management Requirements for Works Contracts
Part 1: *General Engineering and Construction Works*

Steel Pipe Specifications

Pipe description	External Coating	Internal lining
200 Dia steel pipe min 6mm thickness	External coating – 250 microns epoxy with Denso CPT 1000 inner wrap and MDP 032 outer PVC wrap	• 400 microns epoxy lining • Epoxy - Carboguard 891 or Carboguard 550
356 Dia Steel pipe min 4.5 mm thickness	3LPE coating	cement mortar

Pipes manufactured to SANS 719 Grade C / API 5L X42 standard specification

Fittings manufactured to SANS 1476

- FBE coating and lining

Valves BS 5155, EN 593

- Coating and lining - FBE

**PROJECT DESCRIPTION : ALLOCATION OF WORK FOR COMPLETION OF
OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW
INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE**

C3.2: PROJECT SPECIFICATIONS

STATUS

The Project Specification, consisting of two parts, forms an integral part of the contract and supplements the Standard Specifications.

Part A contains a general description of the works, the site and the requirements to be met.

Part B contains variations, amendments and additions to the Standardized Specifications and, if applicable, the Particular Specifications.

In the event of any discrepancy between a part or parts of the Standardized or Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Employer's Agent before the execution of the work under the relevant item.

The standard specifications which form part of this contract have been written to cover all phases of work normally required for civil contracts, and they may therefore cover items not applicable to this particular contract.

C3.2 PROJECT SPECIFICATIONS

PART A: GENERAL

PS1 PROJECT DESCRIPTION

- **Allocation Of Work For Completion Of Outstanding Work For The Project
On The Construction Of New International Softball Stadium In Polokwane**

•

PS2 DESCRIPTION OF THE SITE AND ACCESS

2.1 Access to site

Access to the site can be obtained via the public streets within the perimeter of the site of works.

The contractor shall be responsible for the maintenance and reinstatement of damage caused by him or his agents/deliveries to any property (Private or State Owned), fauna and flora and rights of way.

The contractor shall take cognisance of the aforementioned items and should allow in his rates tendered for any costs that could be incurred due to damages by the contractor.

PS3 DETAILS OF THE WORKS

PS4 CONSTRUCTION AND MANAGEMENT REQUIREMENTS

4.1 General

The Contractor is referred to **SANS 1921: 2004 parts 1, 2 and 3: Construction and Management Requirements for Works Contracts**. These specifications shall be applicable to the contract under consideration and the Contractor shall comply with all requirements relevant to the project.

Certain aspects however require further attention as described hereafter.

4.2 Drawings (*Read with SANS 1921 – 1: 2004 clauses 4.1.7; 4.1.11 and 4.1.12*)

The reduced drawings form part of the tender documents as mentioned under Part T1 and shall be used for tendering purposes only.

The contractor shall be supplied with three complete paper copies of the construction drawings free of charge. The Contractor shall at his own expense re-produce further paper prints required for the construction of the work.

At the completion of the Contract, the Contractor shall return to the Engineer all drawings, provided or made, during the contract period.

Any information which the Contractor has control over and which is required by the Resident Engineer to complete the as built drawings shall be made available to the Resident Engineer before the Certificate of Completion is issued.

Only written dimensions may be used. Dimensions are not to be scaled from drawings unless ordered by the Engineer. The Engineer will supply all figures / dimensions which are not shown on the drawings. The levels or dimensions given on the drawings are subject to confirmation on site. The Contractor shall submit all levels and dimensions to the Engineer for confirmation before he commences with any structural construction work. The Contractor shall also check all dimensions which are given on the drawings and inform the Engineer of any conflicting dimensions.

4.3 Responsibilities for design and construction (*Read with SANS 1921 – 1:2004 Clause 4.2*)

4.3.1 The responsibility strategy followed in this contract shall be A.

4.3.2 The structural and civil engineer responsible for the design in accordance with the specification is: MAKONE Consulting Engineers

4.4 Planning, Programme and Method Statements (*Read with SANS1921-1:2004 clause 4.3*)

4.4.1 Preliminary programme

The Contractor shall include with his tender a preliminary programme on the prescribed form to be completed by all Tenderers. The programme shall be in the form of a simplified bar chart with sufficient details to show clearly how the works will be performed within the time for completion as stated in the Contract Data.

Tenderers may submit tenders for an alternative Time for Completion in addition to a tender based on the initial tendered Time for Completion. Each such alternative tender shall include a preliminary programme similar to the programme above for the execution of the works, and shall motivate his proposal clearly by stating all the financial implications of the alternative completion time.

The Contractor shall be deemed to have allowed fully in his tendered rates and prices as well as in his programme for all possible delays due to normal adverse weather conditions and special non-working days as specified in the Special Conditions of Contract, in the Project Specifications and in the Contract Data.

4.4.2 Programme in terms of Clause 12 of the General Conditions of Contract

It is essential that the construction programme, which shall conform in all respects to Clause 12 of the General Conditions of Contract, be furnished within the time stated in

the Contract Data. The preliminary programme to be submitted with the tender shall be used as basis for this programme.

The following must be stated on the programme:

- (a) The quantity of work applicable to each bar item as well as the rate at which the work will be completed.
- (b) A budget of the value of completed work, month by month, for the full contract period.
- (c) The critical path.
- (d) Work to be undertaken by Local Contractor (if applicable)
- (e) Training Courses
- (f) Schedule of plant and resources to be utilized

The Contractor's attention is also drawn to clause 40.3 of the General Conditions of Contract 2004.

4.4.3 Time for Completion

The tenderer shall indicate under section C1.2.2: **Data provided by Contractor** the time within which the contract shall be completed.

4.4.4 Delay in Completion

The Contractor shall organise the Works in such a manner that no delays occur. Delays due to faulty organisation or lack or shortage of materials or labour or co-operation with other parties or to any other cause within the control of the Contractor will not be countenanced and full power is reserved by the Engineer to order the Contractor to expedite the work should the work, in the opinion of the Engineer, not progress in a satisfactory way.

4.5 Quality Assurance (QA) (Read with SANS 1921 – 1: 2004 clause 4.4)

The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of the Engineer. To this end it will be the full responsibility of the Contractor to institute an appropriate Quality Assurance (QA) system on site. The Engineer will audit the Contractor's quality assurance (QA) system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could cause a delay or failure.

The Contractor shall ensure that efficient supervisory staff, the required transport, instruments, equipment and tools are available to control the quality of his own

workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of the Engineer or the Engineer's representative to act as foreman or surveyor.

4.6 Management and disposal of water *(Read with SANS 1921 - 1: 2004 clause 4.6)*

The Contractor shall pay special attention to the management and disposal of water and stormwater on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

4.7 Earthworks *(Read with SANS 1921 - 1: 2004 clause 4.10)*

4.7.1 Borrow pits and spoil areas

The borrow pits to be used for this contract shall be pointed out at the Site Inspection. The Contractor shall be permitted to use only those borrow pits approved by the Engineer.

The spoil sites shall be determined on site in conjunction with the Engineer and the Employer. The Contractor shall be permitted to use only those spoil areas approved by the Engineer.

Should the Contractor wish to use any other spoil area for the disposal of soil, rubble, vegetation, etc, its use shall be subject to the approval of the Engineer and the landowner.

4.8 Testing *(Read with SANS 1921 – 1: 2004 clause 4.11)*

4.8.1 Process control

The Contractor shall arrange for his own process control tests. The Contractor will be expected of to employ the services of the existing established laboratory on site. T Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Engineer. The costs for these tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing as required.

4.8.2 Acceptance control

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by the Engineer for acceptance control. However, before accepting any work, the Engineer shall have his own acceptance control tests carried out by the laboratory. The cost of acceptance testing shall be to the account of the client.

4.9 Site Establishment *(Read with SANS 1921 - 1: 2004 clause 4.14)*

4.9.1 Contractor's camp site and depot

The Contractor is responsible to provide a suitable site for his camp and to provide accommodation for his personnel, labourers, clerk of works and contracts manager. If the Employer can make any specific site available to the Contractor, such site will be pointed out to the Contractor.

The Contractor shall provide security watchmen for the contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

The chosen site shall be subject to the approval of the Engineer and Employer. Possible locations for a campsite shall be pointed out at the Site Inspection. The Contractor shall conform to all local authority, environmental and industrial regulations.

4.9.2 Power Supply

The Contractor shall make his own arrangements concerning the supply of electrical power at the contractor's campsite. No direct payment shall be made for the provision of electrical services. Electrical power cannot be guaranteed by the service provider. During power failures and shortages, the Contractor must make his own arrangements for the provision of electricity.

The rates tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of a power supply to the works.

4.9.3 Water Supply and Sewer

The Contractor shall erect and maintain on the site proper ablution facilities. The Contractor shall service and maintain the facilities in a clean and hygienic state for the duration of the contract period and on completion of the works from the site.

The Contractor shall make his own arrangements concerning the supply of water and sewer disposal at the contractor's campsite. No direct payment shall be made for the provision of water or sewer disposal.

The Contractor must supply all necessary materials for the water connection at a position pointed out by the Engineer. The availability of water cannot be guaranteed by the Municipality and in the event of water no longer being freely available, the Contractor must make his own arrangements to acquire it.

The rates tendered for the relevant items in the Preliminary and General Section of the schedule shall include all costs for the establishment and maintenance of water supply to the works and the Contractor shall make his own arrangements for the possible conveyance and storage of water if necessary. The Contractor will be held responsible for any wastage of water due to negligence.

4.9.4 Accommodation of Employees

No employees except for security guards will be allowed to sleep or be accommodated on the site.

No housing is available for the Contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site.

No informal housing or squatting will be allowed.

The Contractor shall provide the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets will only be allowed where temporary facilities have to be provided.

4.9.5 Water for construction

The Contractor shall make his own arrangements concerning the supply of water for construction. No direct payment shall be made for the provision of water.

The availability of water cannot be guaranteed by the Municipality and in the event of water no longer being freely available, the Contractor must make his own arrangements to acquire it.

The rates tendered for the relevant items in the schedule of quantities shall include all costs for the establishment and maintenance of water supply for the works and the Contractor shall make his own arrangements for the possible conveyance and storage of water if necessary. The Contractor will be held responsible for any wastage of water due to negligence.

4.9.6 Facilities for the Engineer

A site office for the Engineer is required.

4.9.7 Telephone Facilities

Telephone and facsimile facilities are needed on the site.

4.9.8 Survey beacons *(Read with SANS 1921 - 1 : 2004 clause 4.15)*

The Contractor shall take special precautions to protect all permanent survey beacons or pegs such as bench-marks, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any such beacons or pegs have been disturbed by the Contractor or his employees, the Contractor shall have them replaced by a registered land surveyor at his own cost.

4.10 Existing Services *(Read with SANS 1921 - 1: 2004 clause 4.17)*

The Contractor shall make himself acquainted with the position of all existing services before any excavation or other work likely to affect the existing services is commenced.

The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall be determined on site when such damage should occur.

Services belonging to the following service owners will be encountered:

SERVICE OWNER	TYPE OF SERVICE
Eskom	Electrical/Power lines
Telkom	Telephone lines
Polokwane Municipality	Sewer, water and electrical infrastructure

4.11 Health and Safety (Read with SANS 1921 - 1: 2004 clause 4.18)

4.11.1 General statement

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act (OHSA) No 85 and Amendment Act No 181 of 1993, and the OHSA 1993 Construction Regulations 2003 issued on 18 July 2003 by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatory and employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act in the form as included in section C1.4.

4.11.2 Health and Safety Specifications and Plans

- (a) Employer's Health and Safety Specification
A Health and Safety Specification is included in Section C3.3, Part PE of the tender documents as part of the Particular Specifications.
- (b) Tenderer's Health and Safety Plan
The Tenderer shall submit with the tender his own documented Health and Safety Plan proposed to be implemented for the execution of the work under the contract. The Health and Safety Plan must at least cover the following:

- (i) a proper risk assessment of the works, risk items, work methods and procedures in terms of Regulations 7 to 28;
- (ii) pro-active identification of potential hazards and unsafe working conditions;
- (iii) provision of a safe working environment and equipment;
- (iv) statements of methods to ensure the health and safety of subcontractors, employees and visitors to the site, including safety training in hazards and risk areas (*Regulation 5*);
- (v) monitoring health and safety on the site of works on a regular basis, and keeping of records and registers as provided for in the Construction Regulations;
- (vi) details of the Construction Supervisor, the Construction Safety Officers and other competent persons he intends to appoint for the construction works in terms of Regulation 6 and other applicable regulations; and
- (vii) details of methods to ensure that his Health and Safety Plan is carried out effectively in accordance with the Construction Regulations 2003.

The Contractor's Health and Safety Plan will be subject to approval by the Employer, or amendment if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work, before he has obtained the Employer's written approval of his Health and Safety Plan.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval for his safety plan, shall not be used as a reason to claim for extension of time or standing time and related costs

4.11.3 Cost of compliance with the OHSA Construction Regulations

The rates and prices tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the Construction Regulations and the Employer's Health and Safety Specification as applicable to this contract.

Should the Contractor fail to comply with the provisions of the Construction Regulations, he will be liable for penalties as provided in the Construction Regulations and in the Employer's Health and Safety Specification.

4.12 Management of the environment (Read with SANS 1921 - 1 : 2004 clause 4.19)

Respect for the environment is an important aspect of this contract and the Contractor shall pay special attention to the following:

4.12.1 Natural Vegetation

The Contractor shall confine his operation to the limits of the pipeline reserve (4m wide) for the purpose of constructing the works and where applicable detours, shall be sited in consultation with the Engineer and the local communities.

Only those trees and shrubs directly affected by the works and such others as the Engineer may direct in writing shall be cut down and stumped. The natural vegetation, grassing and other plants shall not be disturbed other than in areas where it is essential for the execution of the work or where directed by the Engineer.

4.12.2 Fires

The Contractor shall comply with the statutory and local fire regulations. He shall also take all necessary precautions to prevent any fires. In the event of fire the Contractor shall take active steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires which may have been caused by him or his employees.

4.12.3 Environmental Management Plan

In addition to the above all requirements according to the Environmental Management Plan will be adhered to.

4.13 Contract Name board

One official contract name board, as per C4.2 *Site Information: Construction Notice Board*, is required for this contract.

4.14 Railway Facilities

The nearest railway siding is Polokwane Railway Station.

PS 5 SECURITY CLEARANCE OF PERSONNEL

Tenderers should note that the Polokwane Municipality may require that Security Clearance investigations be conducted on any number of the Tenderer's personnel.

If so required, by the Polokwane Municipality, the Tenderer must remove personnel as indicated immediately and ensure that they have no access to the works or documentation or any other information pertaining the site.

The Employer shall not be liable for any cost concerning the removal of personnel or the effect thereof on the execution of the work.

PS 6 SUPPLY OF MATERIALS

All material to be used in the Works is to be supplied by the Contractor.

The Contractor shall ensure that the work is not delayed due to the lack of materials on Site, by placing orders for material required under this Contract as soon as possible. No extension of time will be allowed for any delay due to the supply of materials.

Although the quantities have been carefully calculated, it must be considered as approximate only and the Contractor, before ordering any materials, should check the quantities required. The bill of quantities is provisional.

PS 7 EXECUTION OF THE WORKS

7.1 Inspection by the Engineer

No portion of the work shall be proceeded with until the Engineer or his representative has examined and approved the previous stage. If any work is covered or hidden from view before the Engineer or his representative has inspected the work, the Contractor shall at his own cost expose the covered or hidden work for inspection. The Contractor shall also be responsible for making good any work damaged during the uncovering.

7.2 Certificate of Completion

When all the work under the Contract have been completed to the entire satisfaction of the Engineer, he will issue a certificate of completion to the Contractor informing the Contractor of the date the date at which the works are deemed to be completed and accepted by the Employer.

The sureties provided by the Contractor for the fulfilment and completion of the Contract in terms of the Form of Agreement will be released upon the issue of the Certificate of Completion.

PS 8 EXPANDED PUBLIC WORKS PROGRAMME (EPWP) LABOUR INTENSIVE SPECIFICATION *(Read with SANS 1914 -5 2002 and Guidelines for the implementation of Labour-Intensive Infrastructure Projects under the Expanded Public Works Programme (EPWP) second edition 2005)*

8.1 Labour intensive competencies of supervisory and management staff

Contractors having a CIDB Contractor grading designation of **8CE/GB** and higher only shall engage supervisory and management staff in labour intensive works who have either completed, or for the period 1 April 2004 to 30 June 2006, are registered for training towards, the skills programme outlined in Table 1.

Table 1: Skills programme for supervisory and management staff

Personnel	NQF level	Unit standard titles	Skills programme description
Team leader / supervisor	2	Apply Labour Intensive Construction Systems and Techniques to Work Activities	This unit standard must be completed, and
		Use Labour Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage	} any one of these 3 unit standards
		Use Labour Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	
		Use Labour Intensive Construction Methods to Construct, Repair and Maintain Structures	
Foreman/ supervisor	4	Implement labour Intensive Construction Systems and Techniques	This unit standard must be completed, and
		Use Labour Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage	} any one of these 3 unit standards
		Use Labour Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	
		Use Labour Intensive Construction Methods to Construct, Repair and Maintain Structures	
Site Agent / Manager (i.e. the Contractor's most senior representative that is resident on the site)	5	Manage Labour Intensive Construction Processes	Skills Programme against this single unit standard

8.2 Employment of unskilled and semi-skilled workers in labour-intensive works

8.2.1 Requirements for the sourcing and engagement of labour.

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

8.2.1.2 The rate of pay set for the SPWP is R per task or per day.

8.2.1.3 Tasks established by the Contractor must be such that:
a) the average worker completes 5 tasks per week in 40 hours or less; and

b) the weakest worker completes 5 tasks per week in 55 hours or less.

8.2.1.4 The Contractor must revise the time taken to complete a task whenever it is established that the time taken to complete a weekly task is not within the requirements of 5.2.1.3.

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

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

8.2.1.6 The Contractor shall endeavor to ensure that the expenditure on the employment of temporary workers is in the following proportions:

- a) 55% women;
- b) 40% youth who are between the ages of 18 and 25; and
- c) 2% on persons with disabilities.

8.2.2 Specific provisions pertaining to SANS 1914-5

8.2.2.1 Definitions

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

8.2.2.2 Contract participation goals

There is no specified contract participation goal for the contract. The contract participation goal shall be measured in the performance of the contract to enable the employment provided to targeted labour to be quantified.

The wages and allowances used to calculate the contract participation goal shall, with respect to both time-rated and task rated workers, comprise all wages paid and any training allowance paid in respect of agreed training programmes.

8.2.2.3 Terms and conditions for the engagement of targeted labour

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

8.2.2.4 Variations to SANS 1914-5

The definition for net amount shall be amended as follows:

Financial value of the contract upon completion, exclusive of any value added tax or sales tax which the law requires the employer to pay the Contractor.

The schedule referred to in 5.2.2.3 shall in addition reflect the status of targeted labour as women, youth and persons with disabilities and the number of days of formal training provided to targeted labour.

8.2.2.5 Training of targeted labour

- a) The Contractor shall provide all the necessary on-the-job training to targeted labour to enable such labour to master the basic work techniques required to undertake the work in accordance with the requirements of the contract in a manner that does not compromise worker health and safety.
- b) The cost of the formal training of targeted labour, will be funded by the provincial office of the Department of Labour. This training should take place as close to the project site as practically possible. The Contractor, must access this training by informing the relevant provincial office of the Department of Labour in writing, within 14 days of being awarded the contract, of the likely number of persons that will undergo training and when such training is required. The employer must be furnished with a copy of this request.

- c) A copy of this training request made by the Contractor to the DOL provincial office must also be faxed to the EPWP Training Director in the Department of Public Works– Cinderella Makunike, Fax Number 012 328 6820 or email cinderella.makunike@dpw.gov.za Tel: 083 677 4026.
- d) The Contractor shall be responsible for scheduling the training of workers and shall take all reasonable steps to ensure that each beneficiary is provided with a minimum of six (6) days of formal training if he/she is employed for 3 months or less and a minimum of ten (10) days if he she is employed for 4 months or more.
- e) The Contractor shall do nothing to dissuade targeted labour from participating in training programmes.
- f) An allowance equal to 100% of the task rate or daily rate shall be paid by the Contractor to workers who attend formal training, in terms of d above.
- g) Proof of compliance with the requirements of b to f must be proven.

8.3 Typical construction work to be executed applying labour intensive principles

8.3.1 Softball Stadium construction.

- Excavation – Hand excavation
- Backfilling
- Brickwork – Offices
- Hand compaction of backfill.
- Steel Fixing
- Formwork for concrete
- Planting of Grass
- Painting

PART B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

SABS 1200 A : CIVIL ENGINEERING CONSTRUCTION : GENERAL

PSA GENERAL (SABS 1200 A)

PSA 1 **MATERIALS (Clause 3)**

PSA 1.1 Standardisation mark (Clause 3.1)

Add the following to the Clause:

All material delivered to the site shall bear the Official Standardisation Mark.

PSA 2 **PLANT (Clause 4)**

PSA 2.1 Restrictions on employee accommodation (Sub-clause 4.2)

No housing is available for the Contractor's employees. The Contractor shall make his own arrangements to house his employees.

The Employer shall place an area at the disposal of the Contractor to enable him to erect his site offices, workshops and stores. Any facilities shall comply with the requirements of the local authority. The Contractor shall provide his own fencing and site security.

PSA 3 **CONSTRUCTION (Clause 5)**

PSA 3.1 Dealing with water (Sub-clause 5.5)

In addition to the items as set out in Subclause 5.5, the Contractor shall also provide pumping equipment, pipes and other equipment as may be necessary.

PSA 4 **MEASUREMENT AND PAYMENT (Clause 8)**

PSA 4.1 Fixed charge and Value Related Items (Sub-clause 8.2.1)

Replace the sub-clause with the following:

“Payment shall be a lump sum to provide for the Contractor's expenses in connection with:

- (a) setting up and maintaining his organisation, camps and plant on the site;
- (b) effecting the insurance's and indemnities required in terms of the General Conditions of Contract
- (c) meeting all other general obligations and liabilities which are not specifically measured for payment in these contract documents.

The lump sum total of items (a), (b) and (c) as measured and Fixed Charge Items and time Related Items shall not exceed 15% of the nett total Tender Amount. If the Tenderer should tender a higher amount for this item it shall be reduced to the amount allowed above and all other tendered prices increased in the proportion required to retain the same Nett Total Tender Amount.

The tendered lump sum shall not be subject to any variation if the actual value of work done under the Contract exceeds, or falls short of, the Tender Amount, or as a result of an extension of time for completion in terms of Clause 42 of the General Conditions of Contract.

Any payment made under this item shall not be taken into account when determining whether the value of a certificate complies with the "minimum amount of monthly certificate" laid down in the Appendix.

Before any payment is made under this item the Contractor shall satisfy the Engineer that he has provided on site an establishment and plant of good quality and in value exceeding that of the first instalment. The Contractor may be asked to furnish documented proof that he owns the offices and plant on site, the value of which should exceed the amount claimed in the first certificate. In the event that the Contractor cannot satisfy the Engineer as to the value or ownership, the Engineer shall have the right to withhold part of any payments to be made under this item, until the Works have been completed.

Payment of the lump sum shall be made in three separate instalments as follows:

- (a) The first instalment, 50% of the lump sum, will be paid in the first payment certificate after the Contractor has met all his obligations under this sub-clause and has made a substantial start on construction in accordance with the approved programme.
- (b) The second instalment, 35% of the lump sum, will be paid when the value of the work done reaches one half of the Nett Total Tender Amount.
- (c) The third and final instalment, 15% of the lump sum, will be paid when the works have been completed and the Contractor has fulfilled all requirements of this sub-clause. No payment for the scheduled Fixed Charge Items for this contract will not be made

until the requirements regarding and the erection of name boards have been met.”

PSA 4.2 Time-Related Items (Sub-clause 8.2.2)

Replace this sub-clause with the following:

Subject to the provisions of 8.2.3 and 8.2.4, payment of item 8.4 (time-related item) will take place in equal monthly amounts, calculated on the tendered amount for the item, divided by the contract period in months, with the understanding that the total of the monthly payments which was paid for this specific item does not exceed the proportion that the progress of the works to date bears in relation to the works as a whole.

Should the Engineer grant an extension of time, the Contractor is entitled to an increase in the amount tendered for time related items, and this increase must be kept in the same proportion to the original tender amount as the extension of time is to the original time of the completion of the works.

Payment for such increased amounts will be considered as full compensation for all time related, provisional and general costs which arise as a result of the extension of time.

PSA 4.3 Exposing of existing services (add the following Sub-clause 8.9)

Add the following new pay item:

Item:

Excavation by hand in all materials to expose existing services
Unit: m³

The tendered sum must include full compensation for all hand excavation as per the dimension approved by the Engineer for the locating, exposing and moving of existing services. Excavation outside of approved dimensions will not be paid. The rate must also include for backfill and compaction to 90% of mod AASHTO density and, if applicable, the removal of excess material not used for backfill, the securing of excavations, for handling surface and subsurface water, for protection of existing services and for any other activity necessary to complete the work. Free haul of 1,0 km will be applicable on the transport of excess material.

No distinction will be made between classes of material or types of services.

Note: The Contractor must provide sufficient supervision over labourers when services are exposed.

PSA 4.4 Occupational Health and Safety (add the following Sub-clause 8.10)

Add the following new pay items:

Item:

Provision for the cost related to the Occupational Health and Safety Act, 85 of 1993, and the relevant Regulations:

- a) Complete "Notification of Construction" form and submit
Unit: Sum
- b) Prepare a Health and Safety Plan for compliance with all the requirements
of the OHS Act and the Construction Regulations 2003 and submit
to the engineer Preparation of a Health & Safety Plan
Unit: Sum
- c) Compilation of a Risk Assessment prior to Construction
Unit: Sum
- d) Health & Safety induction Training of employees
Unit: Sum
- e) Compilation and keeping up to date the Health & Safety plan and file
which shall include all documentation required in terms of the act, over
the
entire construction period
Unit: Sum

The tendered sum shall include full compensation for providing the above services as required from the Occupational Health & Safety Act. The rate shall include all related costs incurred by the Act, remuneration of personnel, trainers, etc. and equipment required for the execution of the required services as depicted by the Act. The tendered amount for items a, b, c, d and e shall only be paid on the successful completion of the task as approved by the client. The tendered amount for item e shall be paid on a monthly basis.

PSA 4.5 Facilities for Engineer (Fixed Charge) (Sub-clause 8.3.2.1)

PSA 4.5.1 Furnished office (Sub-clause 8.3.2.1 a)

Replace the contents of sub clause **8.3.2.1 a). *Furnished office (1No,)*** , with:

PSA 8.3.2.1 a) 8.3.2.1 a). *Furnished office (1No,)* Unit: Sum

The sums tendered shall include full compensation for fully furnished offices with but not limited to the following items:

Office accommodation

Offices (interior floor space of engineer's office, kitchen and conference room) min:
45m2

2x Ablution Units

Office furniture

20 x Chairs

2 x Desks, complete with drawers and locks
1 x Conference table
Office fittings, installations, and equipment
3 x 220/250-volt power points
3 Double 80-watt fluorescent lights fittings complete with ballast and tubes
1 x Single incandescent light fittings complete with 100 wat globes
1 x Fire extinguishers, 2.5kg BCF type complete, mounted on wall with brackets
1 x Air conditioning units with 2.2kw minimum capacity, mounted and own power connection
1 x A3 Colour Printer and Fax. Capable of Scanning and Copying with 1-year minimum warranty.

Carports

2x Shaded Carports structurally sound and approved by the engineer.

PSA 4.6 Facilities for Engineer (Time Related) (Sub-clause 8.4.2.1)

PSA 4.6.1 Furnished office (Sub-clause 8.4.2.1 a)

Add the following to the pay item:

An office will be required for the Engineer.

PSA 4.6.2 Survey assistant and materials (Sub-clause 8.4.2.1 d)

Add the following to the pay item:

The Contractor shall make available for the duration of the contract period, when required by the Engineer, one skilled and one unskilled survey labourers.

SABS 1200 D : CIVIL ENGINEERING CONSTRUCTION : EARTHWORKS

PSD 1 SPECIFICATION FOR BORROW PITS

5.2.2.2.2 PSD 1.1 SCOPE

This section shall include all work in obtaining materials for work under this contract, negotiation with owners of the ground on which borrow pits are situated, clearing the site, stripping excess or unsuitable overburden, excavating selected material for use on the works, and finishing off the borrow area to the satisfaction of both the owners and the Engineer, all in accordance with these Specifications or as directed.

PSD 1.2 GENERAL

The Contractor shall be solely responsible for the locating and supply of all materials required from borrow pits for the due and proper construction of the works embodied in this contract.

Before commencing operations at any borrow pit the Contractor shall consult the property owner concerned and the Engineer regarding his proposals for operating the quarry or borrow pit and obtaining access thereto.

The Contractor shall take all measures for the protection and control of livestock, etc., which is made necessary by his operations, such as providing of gates in the existing fences and ensuring that all gates are closed during the whole of the time that they are not actually in use by his traffic.

Where access to the Contractor's quarries is not obtainable by existing roads he shall after consultation with the property owner concerned construct such access roads and provide such gates as he requires and as the authorities concerned may agree to, but the cost of construction of such access roads and the provision of gates shall be deemed to be covered by the prices tendered for the construction of those parts of the works in which the materials from the quarries concerned are being used. The provision of gates and subsequent removal of the gates when no longer required as well as restoration of the fence to its former standard will be at the Contractor's expense.

Whenever required by the owner of the land on which the borrow pit is situated or when it appears necessary in the interest of public health, or the prevention of soil erosion, adequate provision for draining the borrow pit must be made.

PSD 1.3 USE OF IMPORTED MATERIAL

The onus shall rest on the Contractor to ensure that the materials used in each stage of the work comply with the requirements for materials as specified for that stage before proceeding with the processing of the next stage and the Contractor is required to ensure that his organisation is at all times properly and adequately equipped to fulfil the above requirements.

All materials which do not conform to the requirements of these Specifications, shall be considered as defective and all such material, whether in place or not, shall be removed from the site of the works by the Contractor at his own expense.

No payment will be made for the shifting of the Contractor's equipment from one borrow pit position to the next.

PSD 1.4 TAKING AND TESTING OF SAMPLES

The Contractor must supply the Engineer with comprehensive test results regarding the proposed borrow material 14 days before any borrowing starts. The results must contain enough information to enable the Engineer to assess the quality and quantity of material available from the borrow site. The total cost

of these tests must be borne by the Contractor. The exploitation of the pit must be planned in such a way that material of varying quality may be planned in such a way that material of varying quality may be selected and loaded directly or otherwise stockpiled temporarily without contamination.

If, after trial, it is found that any sources of supply, which have previously been approved, do not furnish a uniform product, or if the product from any source proved unsatisfactory in any way, the Contractor shall furnish materials from other approved sources.

The Engineer may from time to time instruct the Contractor to submit samples from approved sources of supply in order to ensure that the quality of materials remains satisfactory.

The cost of taking and testing of samples shall be borne by the Contractor.

PSD 1.5 MEASUREMENT AND PAYMENT

The rate for importing material from borrow pits selected by the Contractor or other commercial sources (item 8.3.4(a)2) shall cover the cost of acquiring suitable material, handling and transportation regardless of distance, and placing. No separate payment will be made for location of borrow pits, the taking of samples, the testing of samples, the construction and maintenance of access roads, the clearing of the borrow pit site, the removal and replacement of overburden, the shaping and drainage of borrow pits, the scarifying of access roads, and paying of any royalties.

PSD 1.6 FREEHAUL

Replace clause 5.2.5.2 with:

All haul will be regarded as freehaul.

PSD 1.7 CLASSIFICATION OF EXCAVATIONS

Notwithstanding anything to the contrary as may be contained elsewhere in the specifications, excavations shall be classified according to the specified method of excavation as follows :

- (i) Excavations which are :
 - not specified in as being required to be executed utilising labour intensive construction methods : and
 - specified as being required to be executed utilising labour intensive construction methods but which notwithstanding, are executed by the Contractor using mechanical plant and equipment which is prohibited in terms of the project

specifications, either with the prior authorisation of the Engineer or in breach of the provisions of the specifications :

shall be classified in accordance with the provisions of the SABS 1200 standard specification.

- (ii) Excavations which are specified as being required to be executed utilising labour intensive construction methods and which are so executed, shall be classified in accordance with TABLE 1.
- (iii) Where only softer classes of excavation are required in terms of part 1 to be executed utilising labour intensive methods, the classification for the purposes of determining the cut-off point for labour intensive excavation shall be made in terms of subsubclause (ii) above, and the excavation beyond the cut-off point shall be in terms of subsubclause (i) above. (i.e. a material classified as "intermediate" in terms of subsubclause (ii) may, when not excavated by labour intensive methods, be classified as "soft" in terms of subsubclause (i).
- (iv) Where materials which are specified to be excavated utilising labour intensive construction methods are not in fact excavated by such methods, whether in compliance of an instruction from the Engineer, or in accordance with a concession granted by the Engineer or through default of the Contractor, classification of the material shall be in terms of subsubclause (i) above.

TABLE 1

	NUMBER OF BLOWS REQUIRED FOR A DCP PENETRATION OF 100mm	
	GRANULAR SOIL	COHESIVE SOIL
SOFT - Class 1	≤ 2	≤ 1
SOFT - Class 2	$> 2, \leq 6$	$> 1, \leq 5$
SOFT - Class 3	$> 7, \leq 5$	$> 5, \leq 8$
INTERMEDIATE	$> 15, \leq 50$	$> 8,$
HARD	> 50	-

Measurement and payment

Separate items will be listed in the schedule of quantities for works which are required to be executed utilising labour intensive construction methods and for works to which such requirement does not apply :

Items which apply in respect of Works which in terms of part 1 are required to be executed utilising labour intensive construction methods, are identified in the schedule of quantities by way of the upper case letter "L" suffixed to the item number. Item numbers not suffixed with the letter "L" shall, unless the context implies otherwise, be deemed to apply in respect of Works not required to be executed by labour intensive methods.

Where any item in the SABS 1200 standard specifications or in part 2 refers to the measurement and payment of excavations in terms of increments in the depth of the excavation, the depth increment for excavations required in terms of part 1 to be executed by labour intensive methods shall be taken as 1,0 metre.

The measurement and payment clauses as set out in the SABS 1200 standard specification and in part 2 shall, unless specifically stated to the contrary, apply generally whether or not the Works to which they relate are required to be executed utilising labour intensive construction methods; provided always that where the Works is required to be executed by labour intensive construction methods, each particular clause shall be interpreted and constructed mutatis mutandis in accordance with the provisions of this clause 2.

PARTICULAR SPECIFICATIONS AND VARIATIONS AND ADDITIONS TO THE STANDARD SPECIFICATIONS

C3.3 PARTICULAR SPECIFICATIONS

In addition to the Standardized and Project Specifications the following Particular Specifications shall apply to this contract and are bound in hereafter.

SECTION PC	TRIMMING OF SITE
SECTION PD	MAINTENANCE
SECTION PE	CONTINGENCIES
SECTION PF	MASONRY BRICKWORK
SECTION POHS	OHSA 1993 SAFETY SPECIFICATION

PC TRIMMING OF SITE

PC1 SCOPE

This work shall consist of the finishing of the entire site affected by the Contractor's operations before the issue of the Completion Certificate.

PC2 REQUIREMENTS

After completion of the work covered by this Contract, the entire area affected by the Contractor's operations shall be finished off and cleared up and all loose rock shall be removed, if required, and disposed of as directed by the Engineer.

Under no circumstances shall the Contractor use machines for trimming.

All loose stones, roots or other waste matter exposed on fill or excavation slopes, which are liable to become loosened shall be removed and all debris and muck from clearing operations shall be disposed of and the area affected by the Contractor's operations and all camp sites left in a neat and presentable manner.

All false work, temporary supports and structures, casting yards or platforms and equipment shall be removed from the site and from all ground occupied by the Contractor in connection with the work. All parts of the work and adjacent ground shall be left in a neat and presentable condition, all to the satisfaction of the Engineer.

PC3 MEASUREMENT AND PAYMENT

Measurement and payment for complying with the above requirements will not be made separately, and would be regarded as being provided for in full by relevant payment items under 1200 A - General.

PD MAINTENANCE

PD1 MAINTENANCE DURING CONSTRUCTION

From the time of taking over the site by the Contractor, as set out in the Special Conditions of Contract until the acceptance of the work and the issue of the Completion Certificate, the Contractor shall be responsible for the maintenance of the work and shall rebuild, repair, restore and make good at his own expense all injuries or damages to any portion thereof whether occasioned by the action of the elements or any other cause.

PD2 MAINTENANCE OF COMPLETED WORK

Periods of Maintenance

The periods of maintenance for each completed section of work shall extend for twelve months from the time of acceptance of the work and the issue of the relevant Completion Certificate for that section of the work as the case may be as set out in Clause 53 of the General Conditions of Contract.

PD2.1 Work during Period of Maintenance

The Contractor shall be responsible for the repair at his own expense, of all defects in any of the works constructed by him, or affected by him during construction, all in terms of Clause 53 of the General Conditions of Contract.

PD3 MEASUREMENT AND PAYMENT

Measurement and payment for maintenance as described above shall be deemed to be included in the prices tendered and paid for the various items for which payment is made in terms of this Contract and such prices shall be full compensation for the supply of all supervision, labour, materials, equipment, plant and work necessary for the maintenance thereof.

The retention monies as set out in the General Conditions of Contract, Clause 49 (3) shall be released only upon Final Settlement of the Contract as set out in Clause 52 of the General Conditions of Contract

PE CONTINGENCIES

PE1 CONTINGENCIES

An amount to be spent in part or in whole at the complete discretion of the Engineer. This amount shall not form part of the 15% as is defined in Clause 50 of the General Conditions of Contract.

PF MASONRY WORK

PF 01 SCOPE

This is a SPECIAL SPECIFICATION which covers masonry construction work for the stadium for work which are not covered in the standard specifications

PF 02 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof. All other relevant and applicable SABS regulations are also to be considered as minimum requirements, and in particular SABS 0400: The Application of the National Building Regulations.

OW 371	-	Specification of materials and methods to be used (Fourth revision, October 1993)
SABS 0145	-	Concrete masonry construction
SABS 0249	-	Masonry walling
SABS 0400	-	Application of National Building Regulations
SANS 952	-	Polyolefin film for damp-proofing and water proofing in buildings

PF 03 BRICKWORK CONSTRUCTION

Brickwork for offices shall consist of collar-jointed 220 x 110 x 85 mm clay stock brick and face brick units to, using class 2 mortar, 15mm thick, in stretcher bond and brickwork of pre-galvanized hard-drawn wires not less than 2.8mm diameter, placed every 3rd layer.

PF 04 PLASTERING

All plaster shall comply with the requirements of SABS 523 and section 14 of OW 371.

Plaster shall be finished to a true and even surface with a wood float. All plaster surfaces shall be free from blemishes, cracks, blisters or other defects. Plaster shall turn into reveals and soffits of openings, and all angles shall be true and straight with salient angles slightly rounded.

Plastering of a surface shall be executed in one operation, as no joint marks will be allowed. Plaster on walls shall not be less than 12 mm or more than 20 mm thick and plaster on concrete shall be not less than 10 mm or more than 15 mm thick, except where specifically specified otherwise.

An approved sealant additive (key-coat by Pro Grip or similar approved) shall be mixed into the plaster mixture of 1:1:1 as Cement : Water : Sealant - mixture.

PF 05 SOILCRETE

Where so ordered and scheduled, the culverts shall be backfilled with soilcrete in lieu of a compacted gravel or lean concrete. Soilcrete shall consist of an approved soil or gravel mixed with 7% by mass of 32,5 CEM II Portland cement and only sufficient water to give it a consistency that will permit the soilcrete to be placed, using vibrators, so that all voids between the culverts and the sides of the excavation are properly filled. The height to which the backfill in soilcrete is taken shall be as determined by the Engineer and any remaining backfill shall be carried out as described for granular material.

The aggregate used for soilcrete shall be a sandy material but may contain larger particles up to 38 mm and it shall have a plasticity index of more than 10. Material containing detrimental amounts of silt or clay shall not be used for soilcrete. The aggregate shall be obtained from an approved source.

The soilcrete shall be mixed on Site by means of suitable concrete mixers and the water and cement contents shall be carefully controlled. The material shall be placed and then thoroughly compacted by means of vibrators so that all voids are filled. Stones or other approved form work shall be packed at culvert ends to prevent the soilcrete from flowing outside the required limits.

The rate shall cover the cost of constructing soilcrete backfilling complete, including Portland cement calculated at the rate of 7% of the dry mass of the soil used. Overhaul will not be paid on any cement, water or aggregate used for the soilcrete.

PB 08 MEASUREMENT AND PAYMENT

Unit	Item
PF 01	Brickwork (nominal wall thickness and brickwork join stated) (m²) square metre The unit of measurement for the brick wall shall be the square metre of wall constructed as measured on the centre line. Areas occupied in walls by pipes (sleeves) will be included in the area measured, and corners and intersections common to more than one brick wall will be measured only once. The tendered rate shall include full compensation for constructing the brick wall in accordance with specification PF03, including procurement and delivery to site of bricks.
PF 02	Plastering brick wall square metre (m²) The tendered rate shall cover the full cost to procure materials and plaster wall according to specification PF 04 in this document (inclusive of key-cote). The unit of measurement for the brick wall shall be the square metre of wall plastered measured on the centre line. Areas occupied in walls by pipes (sleeves) will be included in the area measured, and corners and intersections common to more than one brick wall will be measured only once.
PF 03	Soilcrete (area indicated) cubic metre (m³) The tendered rate shall cover the full cost to procure materials and soilcrete indicated area according to specification PF 05 in this document. The unit of measurement for soilcrete shall be the cubic metre of soilcrete and measured as follows: - Volume of soilcrete per toilet = (width of soilcrete in plan indicated on drawing x outside dimension of pit x depth of pit from natural ground level to top of concrete foundation) No extra-over payment will be made for additional soilcrete required in the event that pit excavation dimensions exceed those indicated on drawings or for over-brake.

SECTION POHS: OHS 1993 HEALTH AND SAFETY SPECIFICATION

POHS.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 2003, and all other safety codes and specifications referred to in the said Construction Regulations.

In terms of the OHS 1993 Agreement in Section C1.2.4 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 OHS 1993 and the Construction Regulations 2003.

This safety specification and the Contractor's own Safety Plan as well as the Construction Regulations 2003, 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:

- Lifting and lowering of materials and equipment from the ground onto the pipe pedestals (sewer)
- Deep excavations in soils requiring shoring or reducing of slopes
- Blasting of hard rock or demolition of concrete
- Movement of construction vehicles on site, taking into consideration steep slopes, other traffic and existing services
- Exposure to possible injuries due to mishandling or failure of power and hand tools
- Falling debris, tools and materials from bridge
- Non-conformance to specifications with regards to fasteners and materials
- Risks related to general safety and security on site

Additional risks may arise from specific methods of construction selected by the Contractor which are not necessary covered in the above.

POHS.2 DEFINITIONS

For the purpose of this contract the following shall apply:

- (a) **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 2003. "**Employer**" and "**client**" is therefore interchangeable and shall be read in the context of the relevant document.

- (b) “**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.

- (c) “**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).

POHS.3 TENDERS

The Contractor shall submit the following with his tender:

- (a) a draft Health and Safety Plan as stipulated in Regulation 5 of the Construction Regulations. The Safety Plan must be based on the Construction Regulations 2003 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 2003;
- (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.

POHS.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 9 (Forms to be completed by Successful 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.

POHS.5 RISK ASSESSMENT and SAFETY PLAN

5.1 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 7 of the Construction Regulations 2003).

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.

6.1 Safety Plan

The Safety Plan will be compiled in order to amongst others address the finding made during the Risk Assessment phase. The Safety plan will be compiled and submitted to the Engineer and Client for Approval. Construction work can only commence upon written approval of the Safety Plan by the Client.

POHS.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.

POHS.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 Inspector of the Department of Labour. 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 7 of the Construction Regulations;
- (b) Fall protection as described in Regulation 8;
- (c) Formwork and support work as described in Regulation 10;
- (f) Excavation work as described in Regulation 11;
- (g) Demolition work as described in Regulation 12;
- (h) Scaffolding work as described in Regulation 14;
- (i) Suspended platform operations as described in Regulation 15;
- (j) Material hoists as described in Regulation 17;
- (k) Batch plant operations as described in Regulation 18;
- (l) Explosive powered tools as described in Regulation 19;
- (m) Cranes as described in Regulation 20;
- (n) Construction vehicle and mobile plant inspections on a daily basis by a competent person as described in Regulation 21(1);
- (o) Control of all temporary electrical installation on the construction site as described in Regulation 22;
- (p) Stacking and storage on construction sites as described in Regulation 26; and
- (q) Inspections of fire equipment as described in Regulation 27.

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.

POHS.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 OHS Act 1993 Construction Regulations 2003;
- (b) A copy of this Health and Safety Specification;
- (c) A copy of the Contractor's Health and Safety Plan (Regulation 4);
- (d) A copy of the Notification of Construction Work (Regulation 3);
- (e) A health and safety file in terms of Regulation 5(7) with inputs by the Construction Safety Officer (Regulation 6(7));
- (f) A copy of the risk assessment described in Regulation 7;
- (g) A full protection plan and the corresponding records of evaluation and training of employees working from elevated positions as described in Regulation 8;
- (h) Drawings pertaining to the design of structures (Regulation 9(3)) and formwork and support work structures (Regulation 10(d)) must be kept on site;
- (i) Pronouncement of the safety of excavations must be recorded in a register to be kept on site (Regulation 11(3)(h));
- (j) A copy of the certificate of the system design for suspended platforms (Regulation 15(3));
- (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 7(5));
- (l) Maintenance records of material hoists and inspection results must be kept in a record book to be kept on site (Regulation 17(8));
- (m) A record of any repairs to or maintenance of a batch plant must be kept on site (Regulations 18(9));
- (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 21(1)(j)).

POHS.9 CONTRACTORS RESPONSIBILITIES

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHS Act 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 (OHS Act 1993) and the Construction Regulations 2003.

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 2003, 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 4)

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 5)

The Contractor is in terms of the definition in Regulation 2(b) the equivalent of Principle Contractor as defined in the Construction Regulations, and he shall comply with all the provisions of Regulation 5.

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 2003.

(c) Supervision of construction work (Regulation 6)

The Contractor shall appoint the safety and other personnel and employees as required in terms of Regulation 6 and as set out in paragraph 7 above. Appointment of those personnel and employees does not relieve the Contractor from any of the obligations under Regulation 6.

(d) Risk assessment (Regulation 7)

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 8)

Fall protection, if applicable to this contract shall comply in all respects with Regulation 8 of the Construction Regulations.

(f) Structures (Regulation 9)

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 9 of the Construction Regulations.

(g) Formwork and support work (Regulation 10)

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 10 of the Construction Regulations shall be followed in every detail.

(h) Excavation work (Regulation 11)

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 11 of the Construction Regulations.

(i) Demolition work (Regulation 12)

Whenever demolition work is included in a contract, the Contractor shall comply with all the requirements of Regulation 12 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 13)

The Contractor shall comply with Regulation 13 wherever tunneling of any kind is involved.

(k) Scaffolding (Regulation 14)

The Contractor shall ensure that all the provisions of Regulation 14 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 15)

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 15 of the Construction Regulations.

(m) Boatswain's chains (Regulation 16)

Where boatswain's chains are required on the construction site, the Contractor shall comply with Regulation 16.

(n) Material Hoists (Regulation 17)

Wherever applicable, the Contractor shall comply with the provisions of Regulation 17 to the letter.

(o) Batch plants (Regulation 18)

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 18. The Contractor shall ensure that the General Safety Regulations (Government Notice R1031 of 30 May 1986), 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 19)

The Contractor shall ensure that, wherever explosive-powered tools are required to be used, all safety provisions of Regulation 19 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 20)

Wherever the use of tower cranes becomes necessary, the provisions of Regulation 20 shall be complied with.

(r) Construction vehicles And mobile plant (Regulation 21)

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 21.

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 22)

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 22.

(t) Use of temporary storage of flammable liquids on construction sites (Regulation 23)

The Contractor shall comply with the provisions of the General Safety Regulations (Government Notice R1031 of 30 May 1986) and all the provisions of Regulation 23 of the Construction Regulations to ensure a safe and hazard-free environment to all workers and other persons on site.

(u) Water environments (Regulation 24)

Where construction work is done over or in close proximity to water, the provisions of Regulation 24 shall apply.

(v) Housekeeping on Construction sites (Regulation 25)

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 25 of the Construction Regulations.

(w) Stacking and storage on construction sites (Regulation 26)

The provisions for the stacking of articles contained in the General Safety Regulations (Government Notice R1031 of 30 May 1986) as well as all the provisions Regulation 26 of the Construction Regulations shall apply.

(x) Fire precautions on construction sites (Regulation 27)

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 27 of the Construction Regulations.

(y) Construction welfare facilities (Regulation 28)

The Contractor shall comply with the construction site provisions as in the Facilities Regulations (Government Notice R1593 of 12 August 1988) and the provisions of Regulation 28 of the Construction Regulations.

(z) Non-compliance with the Construction Regulations 2003

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 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 28 as listed in Regulation 30, he will be guilty of an offence and will be liable, upon conviction, to the fines or imprisonment as set out in Regulation 30.

The Contractor is advised in his own interest to make a careful study of the Act and the Construction Regulations 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.

POHS.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 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.

PG GENERIC LABOUR-INTENSIVE SPECIFICATION

The Generic Labour-intensive specification below is the same as SANS 1921-5, Construction and management requirement for works contracts- Part 5: Earthworks activities which are to be performed by hand and should be included in the scope of works without amendment or modification as set out below.

PG1 SCOPE

This specification establishes general requirements for activities which are to be executed

by hand involving the following:

- a) trenches having a depth of less than 1.5 metres
- b) stormwater drainage
- c) low-volume roads and sidewalks

PG2 PRECEDENCE

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

PG3 HAND EXCAVATABLE MATERIAL

Hand excavatable material is material:

a) granular materials:

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

b) cohesive materials:

- i) whose consistency when profiled may in terms of table 1 be classified as very soft, soft, firm, stiff and stiff / very stiff; or
- ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 8 blows of a dynamic cone penetrometer is required to penetrate 100mm;

Note:

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

Table 1: Consistency of materials when profiled

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

PG4 TRENCH EXCAVATION

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

PG5 COMPACTION OF BACKFILLING TO TRENCHES (AREAS NOT SUBJECT TO TRAFFIC)

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

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

PG6 EXCAVATION

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

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

PG7 CLEARING AND GRUBBING

Grass and small bushes shall be cleared by hand.

PG8 SHAPING

All shaping shall be undertaken by hand.

PG9 LOADING

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

PG10 HAUL

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

PG11 OFFLOADING

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

PG12 SPREADING

All material shall be spread by hand.

PG13 COMPACTION

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

PG14 GRASSING

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

PG15 STONE PITCHING AND RUBBLE CONCRETE MASONRY

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

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

Grout shall be mixed and placed by hand.

PG16 MANUFACTURED ELEMENTS

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

PART C4 : SITE INFORMATION

C4.1: LOCALITY PLAN

C4.2: BID DRAWING

POLOKWANE MUNICIPALITY

PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE

C4: SITE INFORMATION

C4.1: LOCALITY PLAN

The project is located in the Limpopo province, approximately 2.5km from Polokwane City and next to Peter Mokaba Stadium. The project lies on erf 688-LS between Burger Street, Suid Street, Magazyn Street. The proposed works are portrayed in the image below highlighting the Softball Stadium Area. The coordinates are 23°55'11.29"S and 29°28'2.93"E.



Figure 1: Locality Plan

POLOKWANE MUNICIPALITY

**PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF
OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW
INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE**

C4: SITE INFORMATION

C4.2 BID DRAWING

PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE BID NUMBER: PM47/2023

Dwg No:	Dwg size	Description
ARCHITECTURAL DRAWINGS		
100	A0	Site Plan_Rev 00
101	A1	Ground Floor Plan_Rev 00
102	A2	First Floor Plan_Rev 00
103	A3	Second Floor Rev 00
104	A4	Roof Plan_Rev 00
105	A5	GF Services Plan_Rev 00
106	A6	FF Services Plan_Rev 00
107	A7	SF Services Plan_Rev 00
108	A8	GF Electrical & Ceiling Plans_Rev 00
109	A9	FF Electrical & Ceiling Plans_Rev 00
110	A10	SF Electrical & Ceiling Plans_Rev 00
300	A11	Elevation_Rev 00
400	A12	Section_Rev 00
500	A13	Door Schedule_Rev 00
501	A14	Door & Window Schedule_Rev 00
502	A15	Shopfront Schedule_Rev 00
700	A16	Finishing Schedule_Rev 00
CIVIL DRAWINGS		
INF-002	A0	SEWER LAYOUT AND SETTING OUT DATA
INF002A	A0	SEWER LONGSECTIONS
INF-003A	A0	WATER LAYOUT AND SETTING OUT DATA REDUCED
INF-004	A0	STORM AND SITE FINISHES GENERAL ARRANGEMENTS, SETTING OUT DETAILS AND LAYOUT PLAN
INF-004-A	A0	SOFTBALL FIELD A, B & C SUB-SURFACE DRAINAGE LAYOUT
INF-005	A0	SOFTBALL FIELD A, B & C MATERIAL AND DETAIL REFERENCE LAYOUT PLAN
INF006A	A0	SPRINKLER LAYOUT AND SETTI OUT DATA REDUCED
INF-FEN-SD-001		FENCE DETAILS SHT 1
INF-FEN-SD-002		FENCE DETAILS SHT 2
INF-FEN-SD-003		FENCE DETAILS SHT 3
INF-SE-SD-001	A0	PIPE BEDDING, ANCHOR BLOCKS, RODDING EYE, MANHOLE AND CONNECTION DETAILS
INF-SE-SD-002	A0	PRECAST MANHOLES & MANHOLE COVER DETAILS
INF-SE-SD-003	A0	PIPE BEDDING , STANDARD CHANNELING, BACKDROP AND RAMP MANHOLE HOLE DETAILS
INF-VT-SD-001	A0	WATER STANDARD DETAILS SHEET 1 OF 2
INF-VT-SD-002	A0	WATER STANDARD DETAILS SHEET 2 OF 2
INF-VT-SD-003		THRUST BLOCK DETAILS
STD001	A1	Road Earthworks Finishing Details
STD002	A1	Field Inlet - Grid Inlet
STD003	A1	Typical Kerbing and Drift Details
STD004	A1	SHT 1 OF 6 Typical junction box config & cover slab
STD004	A1	SHT 2 OF 6 Type A junction box
STD004	A1	SHT 3 OF 6 Type B junction box
STD004	A1	SHT 4 OF 6 Type C junction box
STD004	A1	SHT 5 OF 6 Type D junction box
STD004	A1	SHT 6 OF 6 MANHOLE
STD005	A0	Sub-Surface Drainage
STD006	A0	Stone Pitching and Gabion Matress
STD007	A0	Storm Water Kerb Inlet Details Sht 1
STD008	A0	Down Chute

PROJECT DESCRIPTION: ALLOCATION OF WORK FOR COMPLETION OF OUTSTANDING WORK FOR THE PROJECT ON THE CONSTRUCTION OF NEW INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE BID NUMBER: PM47/2023

Dwg No:	Dwg size	Description
		STRUCTURAL DRAWINGS
STR-PL-01	A0	Pile Foundation Layout & Details
STR-PL-02	A0	Pile Caps and Strip Foundation Layout and Details
STR-PL-03	A0	Surfacebed Layout and Details
STR-PL-04	A0	First Floor Layout & Details
STR-PL-05	A0	Second Floor Layout & Details
STR-PL-06	A0	Steel & Concrete Roof Layout and Details
STR-PL-07	A0	Steel Trusses Layouts and Details Sheet 1
STR-PL-08	A0	Steel Trusses Layouts and Details Sheet 2
STR-PL-09	A0	Steel Girder Layout & Details
STR-PL-10	A0	Section
STR-PL-11	A0	Grand Stand Main Beams Sections
		FIRE DRAWINGS
MECH-FP-102	A0	GROUND FLOOR FIRE PLAN
MECH-FP-101	A0	FIRST FLOOR FIRE PLAN
MECH-FP-101	A0	SECOND FLOOR FIRE PLAN
		DRAINAGE DRAWINGS
MECH-DR-101		GROUND FLOOR DRAINAGE LAYOUT
MECH-DR-101		FIRST FLOOR DRAINAGE LAYOUT
MECH-DR-101		SECOND FLOOR DRAINAGE LAYOUT
		DOMESTIC WATER DRAWINGS
MECH-DW-101		GROUND FLOOR DOMESTIC WATER LAYOUT
MECH-DW-102		FIRST FLOOR DOMESTIC WATER LAYOUT
MECH-DW-103		SECOND FLOOR DOMESTIC WATER LAYOUT
		HVAC LAYOUTS
MECH-HV-101		GROUND FLOOR HVAC LAYOUT
MECH-HV-102		FIRST FLOOR HVAC LAYOUT
MECH-HV-103		SECOND FLOOR HVAC LAYOUT
MECH-HV-104		ROOF HVAC LAYOUT
		ELECTRICAL DRAWINGS
101	A0	Site _ Level 0 Floor Plan Phase 1
102	A0	Level 0 Floor Plan Phase 1
103	A0	Level 1 Floor Plan Phase 1
104	A0	Level 2 Floor Plan Phase 1
113	A0	L0 Ceiling and Electrical Plan
115	A0	L1 Ceiling and Electrical Plan
116	A0	L2 Ceiling and Electrical Plan
117	A0	L3 Ceiling and Electrical Plan
DETAIL-01	A0	MUNICIPAL LAYOUT SWITCHING STATION
DETAIL-02	A0	TYPICAL LAYOUT SOFTBALL STADIUM SWITCHING STATION
DETAIL-03	A0	TYPICAL TRANSFORMER ROOM AND DIMENSIONS
DETAIL-04	A0	TYPICAL LAYOUT MANHOLE DETAILS

ANNEXURE A-ELECTRICAL WORKS SPECIFICATION

SECTION 2
ELECTRICAL INSTALLATION
PROJECT SPECIFICATION

INDEX

ITEM	DESCRIPTION	PAGE
1.	GENERAL DESCRIPTION OF WORK	3
2.	POWER SUPPLY	3
3.	INSPECTION OF SITE	3
4.	SEQUENCE OF WORK.....	4
5.	SCOPE OF WORK.....	4
6.	SUPERVISION	4
7.	MAKING GOOD.....	4
8.	CERTIFICATE OF COMPLIANCE FOR ELECTRICAL INSTALLATION	4
9.	"AS-INSTALLED" DRAWINGS.....	5
10.	CONDUIT AND ACCESSORIES.....	5
11.	LUMINAIRES.....	5
12.	OUTLET POINTS	5
13.	TELEPHONE INSTALLATION	6
14.	DISTRIBUTION BOARDS.....	7
15.	KIOSKS	8
16.	EARTHING	8
17.	POWERSKIRTING	9
18.	PHOTO-ELECTRIC CELLS	10
	<u>SPECIALIST INSTALLATION</u>	10
19.	UPS SPECIFICATION	10
21.	TELEPHONE AND IT SYSTEM SPECIFICATION	44
22.	PABX SYSTEM	78
23.	ALTERNATIVE SUPPLY SUPPLY EQUIPMENT	83
24.	CO-ORDINATION OF MECHANICAL EQUIPMENT	83
25.	CCTV AND DIGITAL VIDEO RECORDING SYSTEM	83
26.	ACCESS CONTROL.....	85
27.	PASSIVE SECURITY ALARM	86
28.	GENERATOR INSTALLATION	88
29.	LIGHTNING PROTECTION	108
30.	TV INSTALLATION.....	115
31.	INSTALLATION DETAILS.....	116
32.	TESTING AND COMMISSIONING	116
33.	WIREWAYS AND WIRING.....	117
34.	DAMAGE TO OTHER SERVICES	117
35.	"AS-INSTALLED" DRAWINGS.....	117
36.	GENERAL	119
37.	CONCRETE CABLE MARKERS.....	119
38.	CABLE MARKING TYPE	119
39.	LABELLING	119
40.	MAINTENANCE MANUAL	121
43.	GALVANIZED CABLE RACKING.....	123
44.	COLOUR CODING	124
45.	SCHEDULE OF LUMINAIRES	129
46.	SCHEDULE OF CABLES.....	130
47.	EQUIPMENT	
	SPECIFICATION.....	130

SECTION 3

PROJECT SPECIFICATION

A. INSTALLATION DETAILS

1. GENERAL DESCRIPTION OF WORK

This part of the Contract comprises the supply, installation and commissioning of the electrical installation as a whole, as described in this specification and applicable drawings, for the New Polokwane Softball Stadium.

The tenderer's attention is drawn to the fact that he must include in his tender price for all equipment, material and labour, in order to carry out the installation in its entirety and to complete it in accordance with this specification and applicable drawings to the satisfaction of the client.

Tenderer's attention is drawn to the bill quantities generally which forms an integral part of the specification and especially the following clauses:

Where the terms "or other approved" is used in connection with proprietary materials or articles, it is to be understood that approval shall be at the discretion of the client.

Where brand of trade names are referred to in the bill of quantities, these shall indicate the quality and type of material or fitting required and no substitution of materials so specified will be permitted unless the authority of the client, has been obtained in writing before tenders close.

2. POWER SUPPLY

The total diversified load of the entire (Mater Plan) stadium is **2 MV**, this will be supplied through a 2 x circuits of 3 Core 11/11kV PILSTA Copper DSTA Cable (Table 18) on the existing ring feed on the boundary of the proposed development refer to drawing TSN-MKN-PE01. The facility has 2 x Small Substations namely :- The Municipal 11kV Substation room and the Softball 11kV Substation room this is broken down under the Medium voltage section of the bills of quantities. The tender schematic layout TSN-MKN-E1 shows the interconnection between the various Medium Voltage equipments in detail.

The essential Electrical Installation will be on Generator Back-up supply in the event of a power failure.

The Contractor shall be responsible for the supply, installation and commissioning of all the specified LV cables.

The Contractor shall supply, install and commission all the DB Boards as specified on the relevant drawings and in this document.

3. INSPECTION OF SITE

POLOKWANE SOFTBALL STADIUM

Tenderers are advised to visit the site and thoroughly acquaint themselves with the nature and extent of the work to be done, and to make allowance for items obviously intended and necessary for the proper completion of the work, although not specifically specified. Claims due to lack of knowledge will not be entertained.

4. SEQUENCE OF WORK

The sequence in which the work is to be carried out must be determined in collaboration with the authorised representative of the Department and in conjunction with the programme of the Main Contractor.

5. SCOPE OF WORK

- Application and co-ordination of the Municipal Supply.
- New electrical installation to all specified new buildings.
- New distribution boards.
- Underground electrical reticulation.
- Underground telephone installation.
- Area lighting.
- Lightning Protection to specified buildings.
- Co-Ordination of Alternative power.
- Co-Ordination of work with the Mechanical Contractor
- UPS Specification
- Telephone and IT System
- New PABX System
- Generator Installation
- Access Control
- Etc (As per B.O.Q)

6. SUPERVISION

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

7. MAKING GOOD

The Contractor will carry out, in all instances, any work to be made good, such as damage to installation, caused by himself or his employees during the implementation of this contract, at his own cost.

8. CERTIFICATE OF COMPLIANCE FOR ELECTRICAL INSTALLATION

The Contractor shall issue a Compliance Certificate, before the date of first delivery, in duplicate and send it to the Project Consulting Electrical Engineer.

In the case of no permanent power supply on first take over, the Contractor will supply a 3kW generator for testing purposes.

POLOKWANE SOFTBALL STADIUM

The first test will be free but all following tests will be at R1000, 00 each and will be deducted from the contract.

9. "AS-INSTALLED" DRAWINGS

A complete set of drawings will be handed over to the contractor for the marking up of "as-installed" drawings.

These "as-installed" drawings and Project Maintenance Manuals will be handed over to the Engineer, to the satisfaction of the Engineer, on date of first delivery.

10. CONDUIT AND ACCESSORIES

The installation must comply with all the requirements of the Local Authority, Telkom and with SABS 0142-1 "Wiring of Premises".

The conduit is to be clear of moisture and debris before wiring is commenced. Except where specifically directed to the contrary by the Department's representative on site, all conduits will be concealed in the building work wherever possible.

The conduit systems must be installed so as to form a continuous earth system as specified in the Wiring Code.

All flush mounted conduit and accessories in walls and in open ceiling space will be of the PVC manufacture. Surface conduit inside buildings (where specified) shall be galvanised steel plain end type Bosal.

11. LUMINAIRES

Light outlet points will be installed generally in the positions indicated on the drawings. These positions will be verified on site in conjunction with the Engineer or his representative.

Light fittings will be similar, or of equal and approved type and manufacture to those indicated in the Schedule of Luminaires. They will include lamps and fluorescent tubes. Incandescent light fittings will have bayonet type lamp holders unless otherwise specified. Ballasts for fluorescent fittings will carry the SABS mark, or as otherwise approved by the Engineer.

Ceiling mounted fluorescent fittings will be secured to concrete ceilings by means of expansion bolts, or "Robor" tool bolts, and to ceiling boards by means of wood screws passing through the boards an adequate distance into the framework behind the ceiling.

Recessed fittings only to be wired to 5A 3-pin socket outlets.

Conduit to light outlet points in areas with lowered ceilings is to be run in the roof space above.

12. OUTLET POINTS

12.1 Lighting

Light points will be installed in positions as indicated on the drawings. All points for Recessed fittings will be wired to 5A socket outlets.

POLOKWANE SOFTBALL STADIUM

All lighting circuits will be wired with 1,5mm² PVC conductors and 2,5mm² earth conductors in 20mm conduits. Switches will be of the Crabtree Diamond Clip On range or other approved manufacture.

Light switches will be of the quick make-and-break type. Only switches of the same manufacturer will be accepted.

Switches will be flush-mounted in 100 x 50 x 50mm pressed metal boxes and be installed at a height of 1200mm above finished floor level to the bottom of the draw box. Light switches will have a rating of 15A and only single lever switches will be used unless otherwise specified.

Switches will be supplied with cover plates of the same colour as the switched socket outlets.

12.2 Switched Socket Outlets

Socket outlets will be installed generally in the positions indicated on the drawings. These positions are to be verified on site in conjunction with the Engineer or his representative. Socket outlets will be of the Crabtree Diamond Clip On range or other approved manufacture.

All socket outlets will be of the combination switch type, 15A, 3-pin. Socket outlets in walls will be flush-mounted in 100 x 100 x 50mm pressed metal boxes with cover plates similar to those for switches. Only socket outlets of the same manufacturer will be accepted.

Switched socket circuits will be wired by means of 2,5mm² phase conductors and a 2,5mm² earth conductor in 20mm dia conduit unless otherwise indicated.

Switched socket circuits will be protected by means of core balance type earth leakage units as detailed.

Socket outlets will be mounted at a height of 300mm and 1200mm above finished floor level to the bottom of draw box unless otherwise indicated.

All switch socket outlets shall be equipped with shutters as specified in SABS 0142-1.

- Note:**
1. **All light and switched socket outlets feeding from Essential power shall have red switch covers.**
 2. **All light and switched socket outlets feeding from UPS and UPS DB's shall have Blue switch covers and switches.**

12.3 Hydroboil

Supply and install an electrical continuous boiling water unit with 10 litre capacity. Type ZIP Hydroboil 10/60, 2kW or other approved complete with Drip Tray as specified by Manufacturer.

13. TELEPHONE INSTALLATION

The Contractor will supply and install the Telephone Distribution Board conducting and sleeve system, for installation of the main telephone cable, as shown on the drawings.

POLOKWANE SOFTBALL STADIUM

The Main Telephone Draw box will be 300 x 300 x 150 mm deep, installed at a height of 600mm above floor level. The distribution board will be complete with door and will be recessed flush. The main telephone draw box will be located as indicated on the drawing, with a 75mm dia PVC sleeve to the outside of the premises or to the nearest telephone manhole.

Telephone outlets will consist of 100 x 100 x 50mm deep, pressed metal, galvanised boxes, mounted 300mm above finished floor level in the positions indicated. Outlets are joined throughout using 25mm dia conduit. Galvanised steel draw wire will be provided throughout with 300mm length draw pieces, left rolled up in all boxes.

Cover plates for boxes will be similar to those for general purposes switch socket outlets and switches.

14. DISTRIBUTION BOARDS

The required pre-painted 1,6mm thick mild steel boards shall either be of the flush, semi-flush or surface mounted types complete with lockable doors. Each board shall be fitted with circuit labelling and legend card installed in permanently fixed steel type legend card holders.

The general construction shall comply fully with SANS IEC 60439-3 Part 1 for flush type boards and Part 2 for the surface types.

The specified equipment shall comply with the following:

Moulded case circuit-breaker: SANS 156

On-load isolators: SANS 152

Earth leakage relays: SANS 767-2

The internal power wiring shall comply fully with 600/1000V grade PVC insulated stranded annealed copper conductors to SANS 1507.

The paint finishes shall be of a high quality paint applied according to the best available method. Baked enamel, electro-statically applied powder coating or similar proven methods shall be used. Painted metal shall be corrosion resistant for period of at least 168 hours when tested in accordance with SANS Methods 155.

The connected load to the boards shall be balanced as equally as possible across multi-phase supplies.

Details of Emergency Power DB's are as follows:

All DB's on Emergency ie.

a. Description

Recessed, wall-mounted with single/double hinged doors, complete with architrave and equipped as per schematic diagrams. Colour will be signal red.

b. Cable entries

POLOKWANE SOFTBALL STADIUM

Bottom and top

- c. Spare Capacity of 30% will be provided in each new distribution board after provision is made for all equipment specified.

15. KIOSKS

- 15.1 The new Kiosk from schematics i.e. "Kiosk E" will be as per the schematic drawing, fabricated completely from 3CR12 passivated and painted signal red. Facilities for padlocking the doors, complete weather, fibre vandal and vermin proof suitable for continuous outdoor operation, and shall be robust construction and must be adequately ventilated.

The kiosks will be approved by the Engineer before it may be purchased. The supply, installation on a concrete plinth, and commissioning thereof, in conjunction with the supply Authority, is included in the Scope of Work.

- 15.2 The contractor must allow for the installation of laminated A3 drawings indicating the electrical reticulation feed to and from the Kiosk and laminated A4 drawings installed in the Kiosk indicating the outlay of the kiosk under consideration. These drawings must be as-built drawings and must be marked as-built drawings.

16. EARTHING

16.1 LT Earthing

The Contractor will install 2 Cu rod earth spikes in close proximity of the kiosk, but spaced at least 5m apart. The earth rods will be protected by 50mm dia PVC sleeves down to a depth of 300mm. These earth spikes will be interconnected by means of 16mm² BCEW and cad welded to the spikes to form an earth mat. Two main connections will be taken from the earth mat to the main LT earth bar in the kiosk or main DB. The earth reading of the LT installation will be 5 ohm maximum and the test witnessed by the Engineer.

16.2 Earthing and Bonding

The building installation will be effectively earthed throughout in accordance with the relevant sections of the latest edition of the Code of Practice for the Wiring of Premises and to the requirements of the Department.

Install additional earthing in the roofs of all buildings under this contract as follows:

- a 10mm² Cu earthwire from the distribution board on the top floor to the ridge of the roof through the ceiling space
- a 10mm² Cu earthwire along the ridge on the inside of the roof from one side of the building to the other side, and connect this wire to the earthwire from the distribution board.

16.3 Earth Conductors

All LV underground shall have Earth Continuity conductors (ECC) as part of the cable design/ structure, except were specifically directed otherwise.

POLOKWANE SOFTBALL STADIUM

17. POWERSKIRTING

17.1 Installation of sleeves for power skirting

Contractor to install 25mm dia PVC sleeves with bends and 100 x 50 x 50mm boxes in concrete and wall for power, telephone and data lines from electrical DB's, telephone DB's and inter connections between power skirting's as indicated on the drawings.

PVC Sleeves to install :

Electrical : From DB to power skirting and between power skirting - 4 x 25mm dia

Telephone : From telephone DB to power skirting and between power skirting's - 2 x 25mm dia

Data : Between power skirting's - 4 x 25mm dia

17.2 Installation of power skirting

Power skirting to be installed on walls, on final floor level and runs to be mechanically interlocked. Where columns fall between runs of power skirting, sleeves must be installed between the runs of power skirting to inter-connect them where the power skirting ends up against the columns.

17.3 Type of power skirting

Supply and installation of three compartment, 3 cover power skirting, type EXECUDUCT (214mm x 55mm) (PVC) with PVC covers, complete with ends Plugs, IT Sockets, Telephone Jackets etc. or other approved Colour: Light Grey.

18. PHOTO-ELECTRIC CELLS

Where photocells are specified for the control of lighting, the photocells will comply with the following requirements :

- The photocell will be mounted on the walls and kiosks or as specified.
- The photo-electric cell will switch street and/or area lights "ON" when daylight drops to approximately 40 lux and it will switch "OFF" at approximately 80 lux.
- The photo-electric cells will have a time delay of not less than 30 seconds.
- Photo-electric cells will comply waterproof and will be of robust construction.
- The material of the cover will not crack, deform or deteriorate in any way whatsoever and will be colour-fast in all weather conditions.
- All photo-electric cells will be provided with suitable mounting brackets.
- The photo-electric cells will be provided with built-in lightning arrestors.
- Samples of photo-electric cells will be submitted to the Engineer for approval prior to the ordering thereof.

POLOKWANE SOFTBALL STADIUM

- The photo-electric cells will be so mounted that light of the street light fittings or the fittings in the area will not interfere with the proper functioning of the photo-cell.
- The prices for the erection of Photo-electric cell will include the supply and delivery and the connection of cables, etc. from the photo cells to mini-sub or distribution boards.
- Type of Daylight switch shall be Panasonic 25 – 30A or other approved.

SPECIALIST EQUIPMENT

19. UPS SPECIFICATION

A GENERAL

19.1 Intent of Document

The specification is intended to cover the complete installation of the uninterrupted power supply. The minimum equipment requirements are outlined, but do not cover all the details of design and construction. Such details are recognised as being the exclusive responsibility of the contractor.

In all cases where a device or part of the equipment is referred to in the singular, it is intended that such reference shall apply to as many devices as are required to complete the installation

19.2 Standards and Codes

Refer to clause 1 of Section 2 of this document for the relevant standards and codes.

19.3 Scope of Work

Supply, delivery, installation and commissioning of the complete uninterrupted power supply specified in this document.

A room will be provided by other trades and the trades and the contractor shall ensure that the space allowed is sufficient for the installation of the UPS and that the ventilation of the plant room is adequate. If any changes to the design have to be made the contractor must inform the consulting engineer in writing.

19.4 Ambient Operating Conditions

- a) Ambient Temperature: 0-40°C
- b) Relative Humidity: 83%
- c) Altitude: 80m.a.s.l

POLOKWANE SOFTBALL STADIUM

- d) Dust: Dusty
- e) Corrosion: High moist leads to content

19.5 **Site Information**

19.6 **Co-ordination**

Due to the nature of the installation, a fixed sequence of operation is required to properly install the complete uninterrupted power supply. The work shall be closely scheduled in order not to delay the entire project.

The contractor shall familiarise himself with the requirements of the other Trades and shall examine the plant and specification covering each of these sections.

The space requirements shall be carefully checked with the other trades to ensure that the equipment can be installed in the proper sequence in the space allocated.

19.7 **Test Certificates and Inspections**

The following tests are to be carried out:

- a) After completion of the works and before first delivery is taken, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installation will be inspected and the contractor shall make good, to the satisfaction of the Representative/Agent, any defects which may arise.
- b) The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installation at completion.
- c) Test reports of both tests as specified under (a) and (b) are to be submitted to the Department.

19.8 **Guarantee and Maintenance**

The Contractor shall guarantee the complete plant for a period of twelfth months after first delivery has taken place.

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.

The Contractor shall maintain the plant in good working condition for the full twelfth month period to the final delivery of the installation. However, should the Contractor fail to hand over the plant in good working order on the expiry of the specified twelfth months, the Contractor shall be responsible for further monthly maintenance until final delivery is taken.

During this period the contractor will undertake to arrange that the plant be inspected at regular intervals (whatever number of visits the contractor deems

POLOKWANE SOFTBALL STADIUM

necessary to fully maintain the equipment) by a qualified member of his staff who shall:-

- (a) Check the mechanical soundness of all parts.
- (b) Check and adjust all the output and control values of the system (voltage, frequency, control voltages, etc.)
- (c) Take control measurements on the major system components and record these measurements.
- (d) Replace all defective components.
- (e) Service batteries.
- (f) Check ventilation UPS equipment.
- (g) Clean all equipment and/or rooms as required.
- (h) Provide 24 hour standby maintenance and repair service at all times, including statutory holidays.

Note: At each visit, which shall be arranged in advance with the client's representative, a record of maintenance carried out shall be kept. The time and date of visits shall be entered in a logbook, which shall be kept in the plant room.

19.9

Materials and Workmanship

- (a) The work throughout shall be executed to the highest standards and to the entire satisfaction of the Representative/Agent who shall interpret the meaning of the Contract Document and shall have the authority to reject any work and materials, which, in his judgement, are not in full accordance therewith. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Engineer.
- (b) All work shall be executed in a first-class manner by qualified tradesman.
- (c) The Contractor shall warrant that the materials and workmanship shall be of the highest grade, that the equipment shall be installed in a practical and first-class manner in accordance with the best practices and ready and complete for full operation. It is specifically intended that all material or labour which is necessary for its proper completion and operation shall be provided without additional cost whether or not shown or described in the Contract Document.
- (d) The Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation work. The contractor shall also be prepared to promptly furnish any information relating to his own work as may be necessary for the proper installation work and shall co-operate with and co-ordinate the work of others as may be applicable.
- (e) All components and their respective adjustment, which do not form

POLOKWANE SOFTBALL STADIUM

part of the equipment installation work, but influence the optimum and safe operation of the equipment shall be considered to form part of, and shall be included in the Contractor's scope of works.

- (f) All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.
- (g) The Contractor shall make sure that all safety regulations and measures are applied and enforced during the installation and guarantee periods to ensure the safety of the public and the User Client.
- (i) The Contractor is to include for all scaffolding required to complete the work required.

19.10 Brochures

Detailed brochures of all equipment offered shall be presented together with the tender documents.

19.11 Submittals

The following information must accompany the tender documents

- (a) The information requested in the schedule of information.
- (b) A paragraph by paragraph schedule of compliance with detailed description of any deviations from this specification.
- (c) If alternative systems are offered, a clear description of the operating characteristics and special features of the equipment along with a motivation for offering the alternative.
- (d) Descriptive and illustrated brochures and other information pertaining to the inverter and ventilation equipment and switchgear.
- (e) The proposed layout as stated.
- (f) Arrangement of batteries
- (g) A sample test report as stated
- (h) The circuit diagram requested
- (i) The information requested
- (j) Tenderers shall submit a list of successful installations completed in the Republic of South Africa.

B. SECTION 2: EQUIPMENT REQUIREMENTS

19.2 QUALITY, STANDARDS AND REGULATIONS

All material and equipment supplied for this contract shall be new and the best of their respective kind. All new materials and equipment supplied, shall comply

POLOKWANE SOFTBALL STADIUM

fully with the requirements laid down in the specification. The whole of the works shall be executed in accordance with best practice and to approval of the engineer. The equipment shall comply with the latest issues of the following standard specifications.

19.2.1 **South African Bureau of Standards**

SANS 150	Insulated wire
SANS 1091	Colour standards for paint
SANS 0142	Wiring code of practice
SANS 1474	UPS units

19.2.2 **Regulations and Rights of Engineer**

Apart from any other authority, which the engineer may have in terms of the contract, he shall have the right to set the standard and to accept or reject part of the specified equipment depending on the quality of material and workmanship offered.

The contractor shall be notified if the quality of such materials and/or workmanship is not acceptable. In such an event, the contractor shall replace the specific part or repair it to the satisfaction of the engineer, all at the cost of the contractor. Such an instruction shall not exempt the contractor from any of his obligations in terms of the contract.

The installation shall be erected and carried out in accordance with :

- a) The Basic Conditions of Employment Act and the Machinery and Occupational Safety Act of 1983, as amended.
- b) The local Municipality by-laws and Regulations as well as the regulations of the local Supply Authority.
- c) The local Fire regulations.
- d) The Regulations of the Department of Posts and Telecommunications.
- e) The Standard Regulations of any Government Department or public service company where applicable.

In addition the contractor shall at his cost issue all notices in respect of the installation to the local authorities, and shall exempt the client from all losses, costs or expenditures which may arise as a result of the contractor's failure to comply with the requirements of the regulations enumerated above.

It shall be assumed that the contractor is conversant with the above-mentioned requirements. Should any requirements, by-law or regulation, which contradicts the requirements of this document, apply or become applicable during erection of the installation, the contractor shall immediately inform the engineer of such a contradiction. Under no circumstances shall the contractor carry out variations to the installation in terms of such contradictions without obtaining the written permission to do

POLOKWANE SOFTBALL STADIUM

so from the engineer.

19.3 UNINTERRUPTED POWER SUPPLY (UPS)

19.3.1 Definitions

- a) **UPS** shall denote the complete UPS unit with associated controls, remote alarm panel and batteries and any accessories required by the system for its successful operation.
- b) **Power Converter Module** shall denote a rectifier, battery charger, inverter, electromechanical by-pass switch and manually operated by-pass switch.
- c) **Rectifier** shall denote that portion of the converter module containing the equipment and controls to convert the incoming AC power to regulated DC power required by the inverter.
- d) **Inverter** shall denote that part that converts the DC supplied by the rectifier to AC satisfying the load requirements.
- e) **Electro-mechanical** by-pass static switch shall denote a by-pass system provided break free switching from inverter to mains operation and vice versa.
- f) **Battery charger** shall denote that portion of the power converter module containing the equipment and controls to convert the incoming AC power to precisely regulated DC power required for battery charging.
- g) **Critical load** denotes the load as presented to the UPS by the computer or other load requiring constant supply and associated circuits and apparatus.
- h) **Means-Time-Between-Failure (MTBF)** shall denote an overall MTBF of the UPS as a complete system.
- i) **A system failure** shall denote any interruption to, or degradation of the critical load bus voltage or frequency beyond the limits set forth herein.
- j) **Efficiency** shall denote the ratio of real output power (kW) to real input power (kW) with the UPS operating at a defined load power at the defined power factor, the battery fully charged and with nominal input voltage.

(A) Input to the UPS

- (a) Input voltage : 400/231V $\pm$ 10% or 231V $\pm$ 5%
- (b) Frequency : 50Hz $\pm$ 4%
- (c) System : 1 phase 2 wire or 3 phase 4 wire with Operative earth conductor, supplied from utility network or standby generator set. Refer to detail specification

POLOKWANE SOFTBALL STADIUM

- (d) Power factor : Not less than 0,8 lagging
- (e) Max starting current : 10 times full load current for not more than $\frac{1}{2}$ a cycle with rectifier soft starting facility.

(B) Output to Load

- (a) Rating : 200 KVA
- (b) Output voltage : 400 Volts
- (c) Frequency : 50Hz $\pm$ 0,5 Hz
- (d) System : 1 phase 2 wire or 3 phase 4 wire with Operative earth conductor. Refer to detail specification
- (e) Voltage regulator : $\pm$ 10% maximum deviation of steady state voltage recovering to within 5% in less than 50 ms and to within 1% less in that 100 ms.
- (f) Frequency stability : Normal automatically synchronised to mains frequency if the latter is within 50 Hz $\pm$ 2% (adjustable window) runs free at 50 Hz $\pm$ 0,5 Hz at any load when mains is out of limits.
- (g) Harmonic content : Less than 4% total distortion
- (h) Amplitude modulation : Less than 2%

(C) Overall Performance

- Efficiency (overall) : 80 – 85%

(D) Ambient Operating Conditions

Refer to Section 1, General – Clause 5

(E) System Description

The system shall consist of a static UPS complete with the following components:

- (a) Rectifier / charger
- (b) Inverter

POLOKWANE SOFTBALL STADIUM

- (c) Battery
- (d) Automatic electronic no-break bypass circuit and switch
- (e) Separate manual bypass switch
- (f) Protective devices and measuring equipment
- (g) The required controls and necessary equipment
- (h) A self-monitoring system with digital readout by means of which all critical functions can be checked.

Note : Requirement (h) is Only For UPS System Above 200kVA

The system shall be capable of providing an uninterrupted supply to the load with the output characteristics as specified for a minimum period of **30 minutes** during a total mains failure (i.e. normal mains and standby generator supply failure). The batteries shall be rated at an AC load power factor of 0,8 lagging.

The complete system, including all controls shall be designed in such a way that the failure of any one vital central component will **NOT** cause a complete system failure. If necessary such a failure must be avoided by connecting the load directly to the mains by means of the bypass switch.

The UPS shall operate satisfactorily synchronous with the mains supply even under severe conditions of up to 100% unbalanced load.

The UPS shall be amply rated to carry the stated full load current. The UPS shall furthermore be capable of withstanding the following overloads.

Static Overloads :	100% of full load continuously.
	125% of full load for 5 minutes
	150% of full load for 2 minutes
	165% of full load for 1 second with inductive decay after initial equipment switch on surge current.

Dynamic Overloads :	300% for less than 5msec.
	1000% for less than 1 msec.

All component parts, cables and other connections shall be amply rated to withstand the overloads stated and maintain the input voltage **at the load** within the tolerances stated.

The equipment shall be designed for the maximum operating efficiency. The efficiency shall be determined when the system is delivering full load at 0,8 power factor with the batteries fully charged. The load required by the auxiliary equipment (controls, alarms, etc.) electronic switches and cabinet fan shall be included in the determination of overall efficiency. A typical test report clearly showing how the efficiencies are calculated shall be submitted with the tender.

It shall be the responsibility of the successful tenderer to ensure satisfactory operation of the complete system for the load to be supplied. It is, therefore, essential that the tenderer acquaint himself fully with typical load conditions

POLOKWANE SOFTBALL STADIUM

before the tender closing date.

All cabinets containing thyristors shall be adequately screened and earthed to prevent direct radio frequency radiation.

Tenderers shall submit with their tenders a schematic diagram showing:-

Input circuit breakers
System busbars
Rectifiers
Batteries
Inverters
Electronic switches
Bypass circuit
Detour circuit
Fuse protection
Output circuit breakers
Oscillator
Power supply circuits to oscillator, alarms, controls, etc.
Battery isolator.

The diagram shall also show the relative phase displacement of the rectifier transformers.

NOTE: This is Not Applicable To Systems Below 200Kva

(F) Inverter Oscillator

The inverter shall contain an oscillator capable of operating and maintaining the inverter output frequency as specified. The inverter oscillator shall be capable of frequency synchronisation and phase locking to the mains (or standby generator) power source frequency. When operating as a slave to the mains or standby power and a failure occurs in the slaving signal, the inverter oscillator shall automatically revert to a free running state and maintain the specified limits. All changes in output frequency to free run or synchronise shall be gradual to suit the load requirements.

(G) Rectifier

The UPS shall have its own rectifier and rectifier transformer which shall operate satisfactorily from the mains or standby supply.

The rectifier shall be of the solid state type providing full wave rectification of the input voltage suitably regulated to suit the input requirements of the inverter.

Where necessary, a high grade DC filter shall be utilised to limit the output ripple to within acceptable levels for the inverter input. Current limiting features shall be provided to protect the rectifier. The current limiting settings shall be variable for final adjustment on site.

Voltage free contacts shall be provided for the malfunction alarms of the rectifier.

An input monitoring circuit shall be provided for the rectifier. This circuit shall switch off the rectifier when the r.m.s. value or frequency of the input voltage falls below present values.

POLOKWANE SOFTBALL STADIUM

The necessary protection circuitry shall be provided to switch off the rectifier if any one of the rectifier phases should fail, thus presenting an unbalanced load to the incoming supply.

The output of the rectifier shall be connected in parallel to the battery and inverter.

The rectifier shall have over temperature protection. Temperature sensing probes shall be placed on the thyristor housing, thyristor mounting, or on the heat sink close to the thyristor. The sensing of the off coming air temperature alone is not acceptable.

Tenderers shall take into account the possible effects of harmonics that may be present on the input supply due to non-sinusoidal waveforms at the rectifier input, phase commutation, the effect of reactance during phase commutation etc. The input voltage monitoring circuits of the rectifiers shall be adequately filtered and buffered to ensure reliable load control and to prevent continuous on-off switching of the rectifiers.

For three phase units each of the three rectifier transformers shall have a different primary to secondary phase displacement in order to minimise the harmonics generated by the rectifiers.

NOTE: This Is Not Applicable For Systems Below 200kVA

(H) Inverter

The inverter shall be adequately protected against any excessive overload or short circuits that occur in the load. Reactive current limiting or other methods shall be employed to render the thyristors short circuit proof. The successful tenderer shall replace any thyristors or any inverter components at his own expense if these should be damaged.

The necessary feedback and control circuits shall be incorporated to ensure satisfactory operation separately or in synchronisation with the mains supply under all conditions of dynamic load variations, stated overloads, severe unbalanced conditions and high operating temperatures. The thyristor bridge shall contain the necessary auxiliary circuitry to ensure satisfactory operation.

The output of the inverter shall be connected in parallel with the thyristor switch output.

Each inverter shall have over temperature protection similar to the over temperature protection for the rectifier.

A discharge device shall be provided across the D.C. input to the inverter, which will discharge any capacitors in the inverter module when it is switched off.

(I) Battery charger

The battery charger shall be a solid state, constant voltage type providing full wave rectification of the input voltage with the output regulated to an accuracy as specified. A high grade D.C. filter shall be utilised to limit the output ripple to the stated tolerance. Current limiting features shall be provided. The value of the

POLOKWANE SOFTBALL STADIUM

current limit setting, shall be in accordance with the maximum allowable charging current that the batteries can withstand.

The maintained voltage on float charge shall be such as to give maximum life to the batteries whilst maintaining the maximum charge conservation and minimising gas formation and water loss. The optimum float charge voltage shall be specified by the battery manufacturer but is expected to be approximately 2,23 volts per cell. The voltage shall be kept within $\pm 0,5\%$ of the nominal value for all loads from no load to the full rated battery charger current when supplying the full output with batteries discharged.

J) Computer rooms/office UPS Installation

The rectifier shall be equipped with **2 independent** over voltage shutdown contacts for maximum charger security.

The battery charger shall be designed to charge the batteries to 90% of its fully charged capacity within 14 hours and to 100% capacity within 20 hours.

The battery charger shall be capable of boost charging the batteries to 2,6 volt per cell. The boost facility shall be manually operated.

The battery charger shall be provided with a current limiting circuit.

The current limit setting shall be variable for easy adjustment on site.

The necessary voltage free contacts for the alarms and battery charger failures shall be allowed for in the tender price.

The battery charger shall have over temperature protection similar to the protection specified for the rectifier.

The battery charger shall have circuitry to inhibit the charging of batteries from the standby generator. This circuitry shall be activated by normally open contacts on the generator control panel. The interconnecting cables will be supplied and installed as part of this contract.

NOTE: This requirement is only applicable for UPS SYSTEMS ABOVE 200KVA

K) Battery

The battery capacity shall be sufficient to provide full load for the specified time. The capacity shall be rated at a maximum specific gravity of 1,245 at 25 C and correctly filled.

Tenderers shall state the discharge capacity of the battery after 10 hours of charge and the battery voltage at its terminals under various conditions. The inverter shall switch off on low battery voltage.

The battery cells shall be of the maintenance free type.

The batteries shall give satisfactory service for a minimum period of **3 years**
Tenderers shall state the maximum expected lifetime of the batteries and motivate their statement, and provide a statement by the battery manufacturer

POLOKWANE SOFTBALL STADIUM

supporting this and starting that the charger offered is suitable for the battery.

The cells must be mounted in a matching steel cabinet or in the same cabinet as the control equipment. The vented type cells should be mounted on a wooden stand, consecutively numbered with positive and negative terminals clearly marked in a ventilated battery room.

The batteries shall be complete with cell inter-connectors and row inter-connectors. The output terminals shall be robust and adequately dimensioned for the output cable terminations.

The inter-connectors between cells and shall be made in a manner giving the lowest volt drop and maximum resistance to corrosion.

All connections to cells must consist of flexible cable to avoid mechanical stress at the cell terminals.

The tenderer shall describe the method of removal and replacement of a faulty cell.

The battery shall be complete with a battery fuse isolator capable of breaking the full load current drawn by the inverter. These battery fuse isolators shall be installed in the inverter unit room or cabinet.

Terminal posts should be effective for the expected lifetime of the battery and should be effective even if the cell is overfilled.

The battery may be resistance grounded through 5000 ohm to 10000 ohm for the purpose of ground fault.

Tenderers shall submit full details with dimensioned drawings of the batteries offered.

Tenderers shall submit the calculations and motivations complete with curves supporting the selection of a specific battery cell.

All cabling for the battery shall be installed on PVC cable trays and fitted to the satisfaction of the engineer.

L) Automatic by-pass switch

An integral automatic bypass switch shall be provided to transfer the critical load without break to the mains should the UPS unit fail. The latter unit shall simultaneously be disconnected from the critical load bus. This transfer shall, however, be inhibited if the mains is out of synchronism with the UPS output. Retransfer to the UPS output shall be on a manual or automatic command. This switch must have a cover fitted screwed to the panel so as to make the operating of this switch impossible without having first removed the cover. This switch cover must also have the following words etched in white with a red background mounted on or adjacent the cover: **CAUTION : BYPASS SWITCH ONLY : ONLY TO BE OPERATED BY QUALIFIED PERSONNEL**

The static switch should prevent "hunting" and after trying unsuccessfully to switch a maximum of **three** times the static switch should be inhibited from further switching.

19.4. CONSTRUCTION OF CUBICLES AND SWITCHBOARDS

All the converter equipment shall be housed in totally enclosed, free standing, floor mounted cubicles, designed to provide adequate ventilation for the equipment.

All cubicles shall be rigid with suitably braced doors providing from access.

All cubicles shall be vermin proof.

All equipment shall be mounted on the metal framework suitably arranged to provide safe operation and ease of access. Fuses and switchgear in particular should be safely accessible even under load conditions.

All power bridges, filters and other major components both in the inverter and rectifier, shall be completely withdrawable to facilitate rapid repair and/or replacement. The method of withdrawal shall be such that a complete module can be extracted in the operating condition so that checks and measurements may be made while in operation and access to all components facilities.

All electronic printed circuit cards shall be of a good quality and shall be easy and simple to interchange.

All auxiliary power supplies shall be duplicated and shall be connected so as to operate in parallel redundancy. At least two primary sources of power shall be provided for each of the power supplies in the system.

Flexible wires shall not be soldered directly onto terminals but shall have a crimped tab, which is soldered onto a terminal or post. The wire wrapping technique shall be employed for electronic circuits where possible.

The front panel alarms shall be clearly and adequately marked in both official languages. A single line mimic layout of the switchgear shall be provided on the front of the cubicles providing a graphic display of the circuitry of the equipment involved.

All input and output power cables shall be terminated using approved cable glands, onto a cable gland support bracket. The cable conductors shall terminate at the connecting busbars or shall be connected directly to the appropriate switchgear. All power cables shall be properly numbered with wrap around cable markers with punched figures to identify cables at each termination point.

19.5 INSTRUMENTATION AND CONTROLS

All the required instrumentation as indicated on the drawings shall be provided.

Supply and install all the necessary controls for the operation of the system.

Facilities shall be provided for controlling the rectifier, switching the inverter on, switching the inverter output to the synchronous motor/alternator and controlling the bypass thyristor switch circuit.

All control switching of the rectifier and inverter as well as the bypass operation

POLOKWANE SOFTBALL STADIUM

shall be pushbutton initiated.

Standard electronic equipment from overseas manufactures shall **not be accepted** if not duly protected with transsorb and metal oxide varistors in power supplies and external communication lines. Standard electronic equipment not internally protected with transsorb or MOV's may be protected externally by means of transsorb and MOV's mounted on klippon type terminals. All external communication and remote power supply lines shall be protected by means of transsorb and MOV's of sufficient rating mounted on klippon type terminals.

19.6 **ALARMS**

All alarms shall be of the tell-tale type with memory features e.g. a flashing light indicated a fault coupled with an audible alarm. The pressing of the appropriate button shall cancel the audible alarm and allow the alarm lamp to burn continuously until the fault is removed.

The following minimum alarm conditions shall be monitored on the equipment:

- (1) Normal
- (2) Mains failure
- (3) Inverter failure
- (4) Shutdown imminent
- (5) Load on mains
- (6) Overload
- (7) Charger fails

Where required a remote panel must be supplied and installed. The alarms indicated must duplicate all the alarms indicated on the UPS control panel. In addition a buzzer must be provided. Any alarm occurring must sound the buzzer to draw attention. An alarm accepts pushbutton to silence the buzzer must be provided.

Provision shall be made on all the alarms mentioned above to the remotely monitored. Normally open contacts shall be supplied at the converter for each alarm for this purpose. The contacts shall close under an alarm condition.

19.7 **VENTILATION**

All equipment racks shall be positioned in logical fashion on the floor in a configuration, which will ensure proper ventilation.

Each cubicle containing heat-generating equipment (thyristors, transformers electronic circuitry, filters, etc.) shall, where necessary, have extraction ventilation fans mounted on the top of the cubicle to assist air circulation. These fans shall be fed from the output distribution panel of the uninterrupted power supply.

19.8 **QUALITY ASSURANCE**

The manufacturer shall be responsible for the performance as specified herein and to prove such performances to the satisfaction of the engineer. Except as otherwise specified, the supplier must utilise facilities acceptable to the engineer.

19.9 **DRAWINGS**

POLOKWANE SOFTBALL STADIUM

As soon as possible after the awarding of the contract, the successful tenderer shall at his expense submit to the engineer for approval, three prints of:

- (1) All general arrangement drawings.
- (2) Detailed dimensioned drawings of all plant and equipment
- (3) Complete wiring diagrams and block schematic diagrams.

At the same time a list of all equipment designations, labels, etc. in both official languages shall be submitted for approval.

The approval of drawings shall not relieve the successful tenderer of his liability to carry out work in accordance with the terms of the contract.

On completion of the contract, a complete set of transparencies of all drawings of a quality acceptable to the engineer shall be handed to the engineer at the expense of the successful tenderer. These final drawings shall include:

- (1) A proper and accurate as-made wiring diagram of the complete installation showing circuit numbers, terminal strip numbers and conductor colours.
- (2) A schematic diagram clearly showing functions and component values. A material list showing make, model and characteristics of all components of the control equipment and switchgear is to be included.
- (3) Fully dimensioned as-made physical layout drawing of the equipment, batteries and ventilation equipment.
- (4) A detailed **schedule** of all wiring.

The contract shall be deemed incomplete until all drawings have been received by the client.

19.10 **TESTS**

The complete testing including the provision of test facilities, instruments, dummy loads and switchgear at the manufacturer's premises in the Republic of South Africa shall form part of this contract. If the factory tests cannot be performed in the RSA, the client may, at his discretion and own cost, decide to attend tests at the supplier's overseas factory. Tenderers shall not allow for this.

For the test in the manufacture's premises the client shall be notified four weeks in advance in order that a representative can be sent to witness these tests.

19.10.1 **Battery tests**

- 1) The output voltage of the battery unit (i.e. all the cells making up one battery) shall be tested with the incoming supply removed.

POLOKWANE SOFTBALL STADIUM

- 2) The full rated load for the battery shall then be connected to it. The voltage shall be measured at 5 minute intervals for the duration discharge period.
- 3) The batteries shall be left to recharge. The voltage shall be checked after 14 hours with the load and incoming supply removed as well as with the load connected but incoming supply removed.
- 4) When fully recharged, the voltage and specific gravity of every cell shall be measured with the incoming supply removed.
- 5) The circulating A.C. current through and the A.C. voltage across the batteries shall be measured when the rectifiers are on with the battery discharged and fully charged.

19.10.2 **Oscillator tests**

- 1) Frequency within tolerances at all loads.
- 2) Parallel redundancy.
- 3) Auto automatic synchronisation for connection of the synchronous motor/alternator to mains via the thyristor switch.

An electronic frequency counter shall be used to measure the frequency.

19.10.3 **Rectifier tests**

- 1) Output voltage of rectifiers at no load and full load with batteries charged and not charged.
- 2) Current limit, both for mains failure and return to mains.
- 3) Switch off value mains input monitor
- 4) Sequential switch on for return to mains.
- 5) Soft start circuits.

19.10.4 **General**

Ammeters will not be acceptable to prove the above items. A wave analyser and a recording oscilloscope will be required. Photographs shall be taken of the oscillograms by the contractor in the presence of the engineer.

The overall efficiency of the complete uninterrupted power supply shall be proved to be within the specified limit at full load and at no load.

POLOKWANE SOFTBALL STADIUM

The overcurrent protection mechanisms of the A.C.B. shall be proved by current injection (either primary or secondary)

The bypass and detour circuits shall be proved.

All alarms, indications and control functions shall be proved. The test instruments provided shall in all cases be of high quality and suitable to be able to adequately assess the quantities being measured and the equipment being tested. All instruments shall be calibrated by a testing laboratory approved by the National Calibration Service of the CSIR. The test equipment remains the property of the successful tenderer

At the completion of the tests, a full test report shall be submitted by the contractor to the engineer in triplicate.

Continuously adjustable dummy loads of a rating suitable to comprehensively test the UPS shall be provided by the contractor as well as any temporary cables required for the connection of the dummy load to the UPS on site.

19.11 **CABINET**

The contractor shall supply and install a metal cabinet with lockable doors of sufficient size to house all operating and maintenance instructions, drawings, spares, tools, etc.

19.12 **SCHEMATIC DIAGRAM**

A schematic diagram of the complete system shall be mounted in a suitable place and shall be resin encapsulated.

19.13 **AUXILIARY EQUIPMENT**

Tenderers shall make all allowances for plant required (i.e. hoist, cranes, trolleys, etc.) ensuring positioning of the equipment in the UPS room.

19.14 **UPS POWER PLUG OUTLET**

All UPS power plug outlets must be of the red non-standard 3-pin type with the earth pin not earthed to the plug baseplate to facilitate the installation of a single earth connection earthing system. Each socket outlet must be provided with a red plug top.

Each socket outlet must be labelled with an engraved label indicating the power circuit number to which it is connected.

POLOKWANE SOFTBALL STADIUM

19.15 DISTRIBUTION WIRING

All sub-distribution wiring circuits must be wired as follows:-

19.15.1 Mains Power Plug Circuit

4mm² PVC/Copper in red and black conductors and a 2,5mm² bare copper earth.

19.15.2 UPS Power Plug Circuit

4mm² PVC/copper in blue and black and a green PVC insulated 2,5mm² earth wire.

The black neutral conductors must be clearly labelled at each end as follows: "UPS" or "OKT"

19.15.2 UPS Earthing

a The main earth bar must be connected to the insulated earth bar of the UPS via removable copper link bar.

1,2m All UPS boards must have insulated earth bars, separately earthed to a clean earth spike by means of 70mm² insulated earth to obtain at least one ohm at the UPS board.

C SCHEDULES OF TECHNICAL INFORMATION

SYSTEM PARAMETERS (To be completed by Tenderer/ Manufacturer)

1.	Net output power of inverter system	kVA
2.	Power factor for which the system is rated	Lagging
3.	Nominal input voltage	Volts

POLOKWANE SOFTBALL STADIUM

4.	Maximum input voltage tolerated	Volts
5.	Minimum input voltage tolerated	Volts
6.	Maximum input frequency deviation tolerated	50 Hz
7.	Maximum and minimum input power factor at rated KVA	0.85 kVA
8.	Maximum harmonic input tolerated for successful operation	%
9.	Nominal output voltage	Volts
10.	Steady state output voltage regulation	Volts
11.	Dynamic output voltage regulation:	
(a)	Step load of 25% between 10% and 100% of full load	%
(b)	150% overload for 1 sec	%
(c)	Input voltage step variation of $\pm 15\%$	%
12.	Time for voltage recovery to steady state:	
(a)	25% step load	ms
(b)	100% step load	ms

POLOKWANE SOFTBALL STADIUM

(c)	150% step load for 1 sec and then returned to 100%	ms
13	Relative output phase angles at 100% unbalanced load (in degrees)	Degrees
14.	Maximum harmonic content of output voltage	%
15.	Overload capacity	
(a)	One hour	%
(b)	One minute	%
(c)	Ten seconds	%
(d)	One second	%
(e)	Five msec	%
(f)	One msec	%
16.	Total input required with batteries charged for rated full load	KVA
17.	Total input required at full load and battery discharged	KVA
18.	Allowable temperature rise across equipment at input air temperature of:	

POLOKWANE SOFTBALL STADIUM

(a)	25°C	°C	
(b)	30°C	°C	
(c)	32°C	°C	
(d)	35°C	°C	
(e)	40°C	°C	
19.	Heat dissipation under normal full load Running		
	Conditions:		
(a)	Converter	KW	
(b)	Battery	KW	
20.	Efficiency of the complete UPS System	<u>1.0p.f.</u>	<u>0.8p.f</u>
(a)	Full load	%	%
(b)	80% load	%	%
(c)	75% load	%	%

POLOKWANE SOFTBALL STADIUM

(d)	65% load	%	%
(e)	50% load	%	%
(f)	40%	%	%
21.	R.M.S. value of the A.C. <u>current</u> component through the batteries for:		
(a)	Discharged battery		Amp
(b)	Charged battery		Amp
22.	R.M.S. value of the A.C. <u>voltage</u> component through the batteries for:		
(a)	Discharged battery		Volts
(b)	Charged battery		Volts
23.	Total number of cubicles		
24.	Total floor space required		m ²
25.	Dimensions of cubicle in mm		W
			H
			L

POLOKWANE SOFTBALL STADIUM

2. BATTERY CHARGER

1.	Type	
2.	Output voltage for trickle charge	Volts
3.	Steady state regulation of output voltage trickle to full load	$\pm$ %
4.	Output voltage for input voltage fluctuation	
(a)	$\pm 10\%$	%
(b)	$\pm 15\%$	%
5.	Ripple content (%)	%
6.	Current limit value	Amp
7.	Input voltage at which battery charger switches off	
(a)	Maximum	Volt
(b)	Minimum	Volt
8.	Maximum switch on inrush current	Ampere

POLOKWANE SOFTBALL STADIUM

9.	Battery charger overload protection (type)	
10.	Efficiency	%
11.	How is the effect of harmonics on input voltage minimised?	

3. OSCILLATOR

1.	Type of oscillator (RC, crystal, etc)	
2.	Stability:	
(a)	With oscillator supply fluctuation	$\pm$ %
(b)	Temperature variation	$\pm$ °C
(c).	Number of power supplies in parallel redundancy	
3.	Number of batteries from which oscillator fed	
4.	Minimum time synchronise to mains frequency	sec

4. INVERTER

1.	Maximum continuous power output (kVA)	kVA

POLOKWANE SOFTBALL STADIUM

2.	Nominal output voltage	Volts
3.	Maximum harmonic content	%
4.	Nominal input voltage:	
(a)	Maximum	Volts
(b)	Nominal	Volts
(c)	Minimum	Volts
5.	Input current at full load	Ampere
6.	Input power factor at full load	Lagging
7.	Efficiency at full load	%
8.	Overload protection	

5. STATIC SWITCH

	Does switch comply to clause 3.2.2.12	

POLOKWANE SOFTBALL STADIUM

1.	Describe electronic switch	
2.	Minimum power factor at which switches will operate satisfactory	
3.	How does switch derive operating signal?	
4.	Maximum break time for switchover	ms

6. BATTERIES

1.	Manufacturer	
2.	Country of origin	
3.	Type	
4.	Type No	
5.	Total number of cells	
6.	Number of cells per inverter	
7.	Battery voltage (float conditions)	Volt
8.	Battery voltage (Boost charge)	Volt

POLOKWANE SOFTBALL STADIUM

9.	Capacity (rated for time required)	Ah at
		Hrs
10.	Battery time offered under load conditions specified in Clause 2.17 Part 2) and (Clause 3.2.2.5 (Part 3)	Minutes
11.	Maximum output current	Ampere
12.	Cell voltage under float conditions	Volts
13	Cell conditions under boost conditions	Volt
14.	Cell voltage at start of discharge and full inverter load	Volt
15.	Cell voltage at end of discharge period	Volt
16.	Expected lifetime of batteries	Years
17.	Time to charge to 90% capacity	Hrs
18.	Total time to charge to 100% capacity	Hrs
19.	Material of supporting framework	
20.	Finish of framework	
21.	Dimensions of each cell	W

POLOKWANE SOFTBALL STADIUM

		H
		L
22.	Design of positive plate of cell	
23.	Rating of fused isolator	Ampere
24.	Cell configuration	

7. SYSTEMS ABOVE 200kVA

1.	No of shelves	
2.	No of rows/shelves	
3.	No of tiers/shelves	
4.	Shelf length	
5.	Shelf height (incl. Batteries)	

NOTE: ALL BATTERY CALCULATIONS INCLUDING CURVES SHALL BE INCLUDED IN THE TENDER

8. DETAILS OF MANUFACTURE OF UPS

1.	Manufacturer	
----	--------------	--

POLOKWANE SOFTBALL STADIUM

2.	Address	
3.	Country of origin	
4.	Make or trade name of equipment	
5.	Manufacture's type no.	
6.	Is tenderer an accredited agent?	YES/NO
7.	Furnish details of maintenance and repair service facilities which can be rendered.	

D. PRICE SCHEDULES

General

- 1.1 The conditions of contract and the application of the Contract price Adjustment Provisions shall be as set out in Part A: Section 1: preliminaries
- 1.2 The descriptions in this Price Schedule shall be read in conjunction with the specification.
- 1.3 The unit rate for each item is the Price Schedules shall include for all materials, labour, profit, transport, etc., everything necessary for the execution and complete installation of the work in accordance with the description.
- 1.4 The Price Schedules shall not be used for ordering purposes. The Contractor shall check the lengths of cables and overhead conductors on site before ordering any of the cables. Any allowance for off cuts shall be made in the unit rates.
- 1.5 The rates shall exclude Value Added Tax and the total carried over to the final summary in PART A
- 1.6 All material covered by the **Specification** shall, wherever possible, be of South African manufacture.

20.3 SCAFFOLDING

The Contractor will supply his own scaffolding when needed.

21. TELEPHONE AND IT SYSTEM SPECIFICATIONS

DETAILED REQUIREMENTS

21.1 SCOPE OF WORK

POLOKWANE SOFTBALL STADIUM

This contract allows for the supply, delivery, installation, commissioning and handing a PABX

The installation shall be in accordance with SANS ARP 031 as applicable.

The Electrical Contractor shall supply and install all the Main Tel MDF (draw box) and draw boxes, conduits and flush mounted data outlet points (including inserts).

The IT and/or Telephone Specialists shall install CAT 6 wiring for data lines for the above building. These are measured in the Electrical Bill. The Telephone Specialist shall allow to install instruments and IP PABX equipment.

The following specific instructions are to be strictly adhered to and allowed for by the Tenderer:

- All new equipment supplied under this contract for the **New POLOKWANE SOFTBALL STADIUM** shall be the product of a single Manufacturer so as to ensure equipment compatibility. The system installed shall be capable of being expanded by at least an additional 25% growth for future expansion.
- No deviations from this specification shall be allowed.
- Prices are to be fixed for the duration of the Contract period.
- Only original copies of the Tender documentation will be accepted.
- No alteration, erasure or addition is to be made in the text of the Bills of Quantities. Should any alteration, erasure or addition be made, it will not be recognized and the original wording of the Bills of Quantities will be adhered to.
- Compliance in writing to each and every paragraph of the Detailed Specification

Full descriptive and technical details of the equipment offered shall be submitted at the time of Tender.

It is the Client's specific request that the Tenderers capabilities and resources will be fully investigated to ensure that service delivery can be met in the shortest possible time frame. The Tenderer shall clearly indicate the following as detailed on the Schedule of Prices:

- Equipment availability (anticipated delivery time from date of official order).
- Installation and Commissioning time required on site.

21.2 STRUCTURAL PROVISIONS

The basic installation including the telephone installation consisting of the Main Telephone Distribution Frame (MDF), the conduit runs, outlets indicating instrument positions are shown on the layout drawing.

The data or dedicated telephone points are to be installed in the positions on the drawings.

The CAT 6 cabling shall be provided and installed by the IT Specialist.

The Telephone Specialist shall allow to supply and install a full IP PABX and Telephone Instruments as detailed in the Bill of Quantities.

POLOKWANE SOFTBALL STADIUM

21.3 SCHEDULE OF REQUIREMENT (SOR):

The IP PABX Telephony Solution shall be complete with all equipment necessary for the efficient operation of the system(s) in accordance with the Schedule of Requirements (SOR) for connection to the Public Telephone Network.

It shall be the Suppliers sole responsibility, immediately upon the award of the Contract to submit all necessary documentation and pay all fees necessary for the timeous issue of this and any other official approvals required.

21.4 TELKOM APPLICATION FOR SERVICE

The successful Tenderer shall allow to liaise with the Engineer and Telkom with respect to the Official Telkom application for the proposed upgrading / installation of the Telephony Services.

Tenderers shall note that the Client shall pay Telkom directly for any relevant Telkom costs applicable to the respective services over and above that already covered in the Bill.

21.5 ACCOMMODATION

The new IP PABX equipment shall be accommodated in the allocated room.

21.6 SYSTEM CONFIGURATION & LINE CAPACITY

Tenderers shall refer to the attached Schedule of Prices for full details of the system requirements and configuration, for the Institution specified in this document.

21.7 UPS / BATTERY BACKUP

An online Uninterruptible Power Supply (UPS System) capable of carrying 60% load for 120 minutes shall be provided.

21.8 LIGHTNING PROTECTION

The Tenderer is to note that all incoming exchange lines and outdoor extensions to and from the IP PABX SOLUTION must be fully protected to withstand lightning and any other extraneously induced voltage surges. The equipment must withstand the surges as specified under specification DPT-SWS-001.

Any additional lightning protection that must be fitted on the MDF or the offered system is to be supplied by the successful Tenderer.

21.9 EARTHING

The PABX SOLUTION and MDF earth must be <10 Ohms, and must be provided at each Institution by the Tenderer. The PABX SOLUTION supplier shall arrange for the earth to be tested to his satisfaction prior to installation.

21.10 TELEPHONE CABLING NETWORK

Cabling shall be installed by the IT and/or Telephone Specialist service provider as part of the IP PABX solution.

This Request for Proposal (RFP) provides a standard base from which to evaluate alternatives for real-time IP systems and to allow the bidder flexibility in providing the most appropriate and cost-effective solution. The acceptance of a Response to RFP does not obligate the **client** to purchase any system, only a firm official order will be considered binding. Subject to Tender Rules and Regulations.

21.11 KEY DECISION CRITERIA

The Client will base its decisions regarding responses to this Request for Proposal on the following criteria.

- **Financial viability and strategic direction.** The bidder of the proposed solution must be financially viable, capable of sustained ongoing support and development of the products proposed. Bidder must have a defined vision for the proposed system that includes a strategic plan for continued and future IP support, as well as legacy investment protection.
- **Asset management** and protection, ensuring the capital investment provides flexibility in adapting future changes in technology. The solution must
 - Support deployment in a vendor-neutral network infrastructure
 - Adhere to industry standards
 - Insure modular, cost-effective growth
 - Support a distributed, scalable architecture
 - Support circuit-switched, packet-switched and mixed network environments
 - Support integration with legacy PBX infrastructures as well as provide interfaces to legacy applications
 - Provide a common interface for managing system and endpoint client configurations
 - Use the same communications hardware and software nationally and internationally, adjusted as necessary for local regulations and operating conditions
- **Efficiencies at the desktop**, helping individual employees communicate better and work more productively at the desktop or other endpoint
 - Support robust, full feature set across digital and IP endpoint clients and PC endpoint clients
 - Support digital and IP endpoint clients across real-time IP systems (product line)
 - Support user mobility through single-number access and wireless devices
- **Common applications**, providing the same functionality all communication platform

POLOKWANE SOFTBALL STADIUM

- Permit addition of advanced, standards-based server applications as needed, such as unified messaging, mobility, contact center, etc.
- Support modular growth in capacity and feature functionality
- Support robust CTI links with industry standards
- **Effective management tools** that provide maximum flexibility, for rapid, efficient and cost-effective configuration changes and centralized management control. The solution must support changes on the real-time IP system for IP, TDM and mixed deployment environments from a common application interface.
- **Global availability**, covering remote serviceability and technical support of the entire proposed solution, including applications. Bidder's resource infrastructure must provide a single point of contact, domestically as well as worldwide. Services available from the bidder must include:
 - Quality assurance process for delivery of services
 - Installation and integration services, including project management and training

POLOKWANE SOFTBALL STADIUM

- Availability of support 24 hours a day, seven days a week through Help Desk infrastructure and online support
- Onsite maintenance services
- Professional services

In addition, the real-time IP system must provide fault tolerance options to ensure continued operation.

Within the specified criteria, each bidder is invited to design a solution meeting defined objectives. Preference

21.12 DETAILED SPECIFICATION REAL-TIME IP SYSTEM SOLUTION

21.12.1 Configuration Requirements

The table below summarizes requirements by user type and location.

ITEM NO.	DESCRIPTION	INITIAL REQUIREMENTS	ULTIMATE REQUIREMENTS
1	19" Rack Mounted IP PABX to be equipped as follows:	1	
1.1	Attendant Console/s	1	
1.2	Busy Lamp Indicator/s (12 Key DSS)	1	
1.3	Both way Analogue Exchange Line Ports	4	
1.4	ISDN Primary Rate Lines (1 PRI = 30 Channels)	1	
1.5	ISDN Basic Rate Lines (1 Line = 2 Channels)	-	
1.6	Analogue Extension Circuits	-	
1.7	Digital Extension Circuits	-	
1.8	VOIP Extensions	10	
1.9	Music on Hold (External)	1	
1.10	Administrator Software (for Programming)	1	

POLOKWANE SOFTBALL STADIUM

1.11	Connection to Public Address System	-	
1.12	Lightning Protection on system	Lot	
	User Handsets/Telephone Instruments:		
1.13	Executive IP Telephones	2	
1.14	Conference IP Telephone	-	
1.15	Entry Level IP Telephones	10	
1.16	Cordless Telephones	-	
	Auto Attendant /Voicemail System		
1.17	Voicemail Platform Software (4 Port)	-	
1.18	Voicemail Platform PC Hardware	-	
1.19	Voicemail Platform Users	-	
	Telephone Management System		
1.20	Telephone Management Software	1	
1.21	Telephone Management Hardware	1	

POLOKWANE SOFTBALL STADIUM

1.22	Telephone Management System Users	10	
1.23	Call Barring Users	10	
1.24	Buffer	1	
1.25	Lazer Printer	1	
	UPS/Battery Backup System		
1.26	1 Kva UPS/Battery Backup Unit (120 Minutes backup time)	1	
	Training		
1.27	Allow for training 2 Operators in the use of the system	Sum	
	Testing & Commissioning of system		
1.28	Allowance for testing and commissioning of system	Sum	
2	Telkom Liaison		
2.1	Allow for submission of all necessary applications to Telkom and arrangements with Telkom for the conclusion of the Contract	Sum	
	Maintenance		
2.2	Allow for the complete maintenance of the system for a period of 12 months from the first delivery date of the buildings	Sum	
	Manuals		
2.3	Allow for the issues of 3 sets of documentation (Technical Specifications, User Manuals, Wiring diagrams, etc.)	Sum	

POLOKWANE SOFTBALL STADIUM

Contents

3	List of Questions	47
3.1.1	General Information.....	48
3.1.2	Quality Assurance	48
3.1.3	Environmental Conditions	49
3.4	Systems Engineering	50
3.1.4.1	System Security	50
3.1.4.2	Traffic Capacity	50
3.1.4.3	Data Protection.....	51
3.1.4.4	Remote Administration/Remote Diagnosis/Remote Maintenance.....	51
3.1.5	IP-Distributed System Architecture	52
3.1.6	Subscriber Interfaces in TDM Technology	53
3.1.7	IP Subscriber Interfaces.....	53
3.1.8	Interfaces to Service Providers/Special Equipment.....	54
3.1.9	System Features.....	55
3.1.10	Call Detail Recording.....	56
3.1.11	Subscriber Features.....	57
3.1.12	Networking Communication Systems	58
3.1.12.1	Networking over Conventional Interfaces	58
3.1.12.2	Networking over IP-Based Infrastructures	59

POLOKWANE SOFTBALL STADIUM

3.1.12.3 Functions in the Network.....	60
3.1.14.4 Heterogeneous Networks	61
3.1.12.5 Features Available when Networking Systems from the Same Vendor.....	61
3.1.12.6 Networking with the Session Interaction Protocol (SIP).....	63
3.1.13 Synchronizing the Network.....	63
3.1.14 Least Cost Routing (LCR) and Route Optimization.....	64
3.1.15 Virtual Networking	64
3.1.16 Local Management Tool in Standalone Systems	65
3.1.17 Attendant Console on PC Basis	67
3.1.18 Integrated Entry Voice Mail System	68
3.1.19 Integrated Voice Mail System	69
3.1.20 Computer Telephony Integration (CTI).....	70
3.1.21 Integrated Router Function.....	71
3.1.22 Integrated mobility solution	72
3.1.23 Cordless System.....	72
3.1.24 Teleworking/Teleworkstations and Desk Sharing for IP Softphones	72
3.1.25 Encryption.....	73
21.13 List of Questions	

POLOKWANE SOFTBALL STADIUM

21.13.1 General Information

Vendor:

Type/system name:

Nearest service center :

Tel.:

Reachable: from - to Weekdays:

Sundays and holidays:

Are spare parts available in the service center specified? yes ☐ no ☐

What is the lead time for spare part provisioning? in hours:

Number of service technicians available in the specified service center and trained to service the system type tendered :

Indicate escalation procedures to equipment Manufacturer / Supplier.

Does the vendor of the communication server tendered have complementary divisions or solution offerings so that overall solutions can be offered from a single source? yes ☐ no ☐

Does the vendor have the following complementary divisions that could supplement the communication server tender?

System house (solution provider)	yes ☐	no ☐
Computer vendor	yes ☐	no ☐

Does the Manufacturer/Supplier of the communication server tendered belong to international standardization committees? yes ☐ no ☐

ECMA	yes ☐	no ☐
ECTF	yes ☐	no ☐
ITU	yes ☐	no ☐

Is the Manufacturer/Supplier of the communication server tendered involved in cooperation partnerships with leading computer vendors, software houses and/or system integrators, thereby assuring cross-system overall solutions? yes ☐ no ☐

.....

Does the Manufacturer/Supplier of the communication server tendered have a global presence and offer global solutions? yes ☐ no ☐

EU	yes ☐	no ☐
EMEA	yes ☐	no ☐
USA	yes ☐	no ☐
South America	yes ☐	no ☐
Asia	yes ☐	no ☐
Africa	yes ☐	no ☐

21.13.2 Quality Assurance

Are the requirements of DIN EN ISO 9001 satisfied and implemented for the following areas?

Development	yes ☐	no ☐
Production	yes ☐	no ☐

POLOKWANE SOFTBALL STADIUM

Sales	yes	☐	no	☐
Customer Service	yes	☐	no	☐
- Are the boundary conditions of DIN EN ISO 140001 (environment) satisfied and implemented?	yes	☐	no	☐
Certificate valid until	:	.....		
Registration number	:	.....		

21.13.3 Environmental Conditions

Dimensions and weights

Number of cabinets including any MDF, power supply, server and expansion cabinets :cabinets

Dimensions per cabinet: : Height mm
Width mm
Depth mm

.....

Average weight per cabinet : approximately kg

.....

Minimum room height required : cm
..... cm

In what type of configuration is the overall system available?

19-inch cabinet	yes	☐	no	☐
Floor-type system	yes	☐	no	☐
Wall-mounted system	yes	☐	no	☐

Footprint for the system tendered : m²

Maintenance footprint required : m²

Power supply/battery footprint : m²

Additional floor space required for the main distribution frame, if not supplied as cabinet : m²

..... m²

..... m²

A detailed space assignment proposal should be attached to the offer specifying the minimum space requirement (including all systems tendered).

Room conditions

Is air conditioning required in the room? yes ☐ no ☐

Permitted ambient temperature : from + °C to + °C

Is compulsory ventilation required for the cabinets? yes ☐ no ☐

Permitted relative humidity : from % to %

POLOKWANE SOFTBALL STADIUM

Electrical power supply

Operating nominal voltage, primary	:	.....	V
Current requirement, primary (nominal consumption at 230 V)	:	.....	A
Operating nominal voltage	:	.....	V
Permitted range	:	.....	V

The following values must be specified for the tendered configuration including centrally powered telephones, PNT, adapters, integrated/adapted servers, etc.

Current requirement, secondary, during peak hours	:	.....	A
Current requirement, secondary, during no-load operation	:	.....	A
Energy requirement, primary during no-load operation	:	.....	kW
during peak hours	:	.....	kW
Dissipated system heat during peak hours	:	.....	kJoule/h

CE Conformity

Does the system tendered support the following standards:

EN 60950-1, Safety	yes	☐	no	☐
EN 61000-6-2 (EMC Immunity, Industrial)	yes	☐	no	☐
EN 55024 (EMC Immunity, Residential)	yes	☐	no	☐
ETS 300329 (DECT Emission/Immunity)	yes	☐	no	☐
TBR 06 and ETS 301489-1/6 (DECT Air Interface)	yes	☐	no	☐

21.13.4 Systems Engineering

System Security

What happens if an interruption occurs during connection setup?

Please explain:

.....
.....

Does the system automatically restart after a power failure?	yes	☐	no	☐
---	-----	--------------------------	----	--------------------------

On which media, if any, is data saved in the event of a breakdown?

File server	yes	☐	no	☐
Multimedia card (MMC)	yes	☐	no	☐

Traffic Capacity

The central control and switching networks are dimensioned to cope with traffic volumes during peak hours for all types of traffic and traffic devices from all communication services.

Please specify the total traffic capacity (Erl) for which the control and switching networks are dimensioned or can be dimensioned. The values specified must include a loss of B=0.1%.

POLOKWANE SOFTBALL STADIUM

To be implemented by the offered for the system tendered:

Total traffic value tendered.....ErI

Max. possible total traffic value.....ErI

Explanation:.....

.....

21.13.5 Data Protection

Does the system tendered offer appropriate data protection measures as required by:

Relevant Federal Data Protection Act (LDSG)? yes ☐ no ☐

Recommendations of the Federal Office for Information Technology Security (BSI) yes ☐ no ☐

What options does the system offer for making recorded call data anonymous?

Saving the complete destination number, but abbreviated for output and utilization yes ☐ no ☐

Digit number for abbreviations can be freely defined yes ☐ no ☐

Does the system allow the user to define whether the A station number is displayed at the B station in digital telephones with display?

yes ☐ no ☐

Operating mode:

The number is displayed by default but can be suppressed by the A subscriber for specific calls yes ☐ no ☐

Appropriate measures should be put in place to prevent access to personal data saved on the system from operating terminals.

Is access authorization over the operating terminal password-protected? yes ☐ no ☐

Can individual passwords be assigned function-specific access rights? yes ☐ no ☐

Are the passwords saved in encrypted form in the system? yes ☐ no ☐

Is a compulsory log kept of all attempts to access administration and maintenance jobs for inspection purposes? yes ☐ no ☐

Can station numbers and settings saved on digital telephones be protected against unauthorized access? yes ☐ no ☐

21.13.6 Remote Administration/Remote Diagnosis/Remote Maintenance

Has an interface to a service center been provided for remote administration/remote diagnosis/remote maintenance in the event of a service contract? yes ☐ no ☐

How is access protection ensured?

.....

Can functions and jobs be performed for multiple systems from a common service center? yes ☐ no ☐

Can service technician intervention automatically requested in the event of a malfunction? yes ☐ no ☐

Can the system software be administered? yes ☐ no ☐

POLOKWANE SOFTBALL STADIUM

Can customer-specific system data be updated remotely? yes ☐ no ☐

Has a security qualification been carried out for the remote access? yes ☐ no ☐

If yes, please state the certification body and the certificate registration number:

21.13.6 IP-Distributed System Architecture

Does the system tendered support the decentralization of system parts across the corporate IP network? yes ☐ no ☐

If so, which standards are supported when networking system parts over the IP infrastructure?

Voice codec in accordance with ITU G.711 yes ☐ no ☐

Voice codec in accordance with ITU G.723 yes ☐ no ☐

Voice codec in accordance with ITU G.729AB yes ☐ no ☐

Voice codec in accordance with ITU G.722 (for internal connections) yes ☐ no ☐

Variable compression adjustable for each gateway yes ☐ no ☐

Adjustable jitter buffer yes ☐ no ☐

Which quality parameters are supported in the IP network?

IETF DiffServ (RFC 2474) yes ☐ no ☐

IEEE 802.1d (including 802.1p) yes ☐ no ☐

IEEE 802.1p tags yes ☐ no ☐

IEEE 802.1q yes ☐ no ☐

Type of Service (TOS) in accordance with RFC 791 yes ☐ no ☐

DTMF recognition in accordance with RFC 2833 yes ☐ no ☐

Echo suppression in accordance with G.168 yes ☐ no ☐

Support for the fax protocol standard in accordance with T.38 yes ☐ no ☐

Mechanisms for optimizing bandwidth requirements through

voice activity detection yes ☐ no ☐

transmission of background noise in voice activity pauses yes ☐ no ☐

dynamic distinction of voice and fax/modem yes ☐ no ☐

How many locations can be networked?

How many connections are supported for each connection module?

no Is the Single Network Time Protocol supported? yes ☐ ☐

Are backup concepts in place for IP infrastructure breakdown? yes ☐ no ☐

If so, which measures are available in the system tendered to guarantee availability?

Use of prioritization measures in routers, such as "priority queuing" for RTP? yes ☐ no ☐

Separate VPN tunnel function for speech? yes ☐ no ☐

Survivability concept in the failed IP network for voice transmission over ISDN? yes ☐ no ☐

POLOKWANE SOFTBALL STADIUM

Are essential restrictions anticipated with regard to system or station features in networked system parts?	yes	☐	no	☐
Can the configuration limits of the base system be extended with remote system parts?	yes	☐	no	
☐				
If so, how many ports are available in total?	.....			
Can optimized resources be provided for signaling and voice transmission?	yes	☐	no	☐
Does this mean that resources from other IP gateways in a node can also be made available to other IP subscribers?	yes	☐	no	☐

21.13.7 Subscriber Interfaces in TDM Technology

Are the following subscriber interfaces provided by the system tendered?

Analog interface (T/R)	yes	☐	no	☐
Analog interface with automatic signaling method recognition (DP/DTMF)	yes	☐	no	☐
S₀ interface	yes	☐	no	☐
Wire number and transmission procedures:				
D-channel protocol:				
U_{P0/E} interface	yes	☐	no	☐
Wire number and transmission procedures:				
D-channel protocol:				

S₀ bus information

How is the S₀ bus implemented?

Directly from the system	yes	☐	no	☐
Over a PNT as a separate device in an independent housing	yes	☐	no	☐
Integrated in a U _{P0/E} telephone	yes	☐	no	☐
Can up to eight devices be connected?	yes	☐	no	☐
Can terminals on the S ₀ bus use the same service?	yes	☐	no	☐
Can terminals on the S ₀ bus use different services (voice, fax, data, etc.)?	yes	☐	no	☐
Can a telephone on the S ₀ bus also be reached over multiple station numbers?	yes	☐	no	☐
If more than one telephone is operated on the S ₀ bus, can each be reached over a separate station number?	yes	☐	no	☐

21.13.8 IP Subscriber Interfaces

Does the system tendered support the direct connection of IP terminals and soft clients?	yes	☐	no	☐
If so, which standards are supported for direct connection over IP infrastructures?				
Voice codec in accordance with ITU G.711	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

Voice codec in accordance with ITU G.723	yes	☐	no	☐
Voice codec in accordance with ITU G.729AB	yes	☐	no	☐
Voice codec in accordance with ITU G.722 (for internal connections)	yes	☐	no	☐
Support for quality parameters in the IP network	yes	☐	no	☐
If so, which parameters are supported?				
IETF DiffServ (RFC 2474)	yes	☐	no	☐
IEEE 802.1p	yes	☐	no	☐
Type of Service (TOS) in accordance with RFC 791	yes	☐	no	☐
Support for DTMF dialing in accordance with Q.24?	yes	☐	no	☐
If so, which functions are supported?				
DTMF signal recognition	yes	☐	no	☐
Conversion of DTMF signals into H.245-compliant signals	yes	☐	no	☐
Generation of DTMF signals when connecting to the public PSTN	yes	☐	no	☐
Are the data packets for a voice connection routed in the IP network?	yes	☐	no	☐
Is the scope of features offered by system-specific telephones also available at IP terminals?	yes	☐	no	☐
If not, which functions are not available?				
.....				
.....				
How many IP terminals can be connected per gateway?	.....	.....		
Is it possible to log on network-wide from IP terminals/soft clients?	yes	☐	no	☐
Can a station be reached at its original station number?	yes	☐	no	☐
Is support provided for the Session Interaction Protocol (SIP) in addition to the system-specific protocol?	yes	☐	no	☐
Which SIP features are supported by the SIP terminal?				
Hold	yes	☐	no	☐
Consultation hold	yes	☐	no	☐
Calling Line Identification Presentation	yes	☐	no	☐
Calling Line Identification Restriction	yes	☐	no	☐
Screened transfer	yes	☐	no	☐
CLIP	yes	☐	no	☐
COLP	yes	☐	no	☐
Inband DTMF mit Codec nach G7.11	yes	☐	no	☐

21.13.9 Interfaces to Service Providers/Special Equipment

Are the following system interfaces provided by the system tendered?

S ₀ ISDN trunk connection (basic access)	yes	☐	no	☐
S _{2M} ISDN trunk connection (primary rate connection)	yes	☐	no	☐
HKZ with CLIP-function according to	yes	☐	no	☐
ETSI (Varianten 1 up to 14)	yes	☐	no	☐
Bellcore GR 30 CORE (TIA-777-A)	yes	☐	no	☐
Dedicated line with E&M signaling	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

Dedicated line with S ₀ interface	yes	☐	no	☐	
Dedicated line with S _{2M} interface	yes	☐	no	☐	
Interface for connecting speaker systems, entrance telephone systems, etc.	yes	☐	no	☐	
Interface for integrating a cordless multicell solution in accordance with the DECT standard	yes	☐	no	☐	
SIP Carrier access	yes	☐	no	☐	
Is it possible to connect ISDN and SIP parallel?	yes	☐	no	☐	
Is it possible to connect several SIP provider?	yes	☐	no	☐	
Is Least Cost Routing supported at parallel connection (ISDN/SIP)?	yes	☐	no	☐	
Which Internet telephony providers are supported?					
	Neotel	yes	☐	no	☐
	Vodacom	yes	☐	no	☐
	MTN	yes	☐	no	☐
	Vox Orion	yes	☐	no	☐
	ECN	yes	☐	no	☐
Other (Please explain)		yes	☐	no	☐
Other Provider.....					

21.13.10 System Features

Can identification data be displayed at digital terminals (for example: names of internal subscribers and station numbers)?	yes	☐	no	☐
Can voice functions (such as, call forwarding, call transfer, etc.) also be used for non-voice services?	yes	☐	no	☐
Fax	yes	☐	no	☐
Data	yes	☐	no	☐
Can DTMF signals be sent over external lines for suffix dialing/operating external devices or services without using terminal-specific DTMF transmitters?	yes	☐	no	☐
From dial-pulsing telephones (DP)	yes	☐	no	☐
From digital telephones	yes	☐	no	☐
From IP telephones/soft clients	yes	☐	no	☐
How are the terminals powered?				
Analog and digital terminals:				
- Central	yes	☐	no	☐
- Local	yes	☐	no	☐
IP terminals:				
- Power over Ethernet in accordance with IEEE 802.3af	yes	☐	no	☐
- Local	yes	☐	no	☐
Which terminals are powered by local equipment?				
.....				

POLOKWANE SOFTBALL STADIUM

Does the system tendered guarantee uninterrupted operation for the entire system configuration in the event of a power failure?	yes	☐	no	☐
With battery connection	yes	☐	no	☐
With uninterruptible power supply	yes	☐	no	☐
Can terminals be relocated without any administrative intervention in the system simply by identifying the relevant terminal and plugging it in elsewhere?	yes	☐	no	☐
Do announcements played back to the caller always start from the beginning?	yes	☐	no	☐
Is music on hold played for queued callers?	yes	☐	no	☐
Can the display be customized?	yes	☐	no	☐
Can calls be signaled at more than one telephone at once?	yes	☐	no	☐
Does the system feature an integrated module for playing SAMRA-free music?	Yes	☐	no	☐
Is there an option for selecting different pieces of music?	Yes	☐	no	☐
Can the communication server operate as a multi-tenant system or a tenant service?	yes	☐	no	☐
If so, what functions are provided?				
Operation of trunk lines with different CO numbers	yes	☐	no	☐
Operation of different attendant consoles	yes	☐	no	☐
Attendant intercept	yes	☐	no	☐
Different night service destinations according to attendant console	yes	☐	no	☐
Call prevention within a system	yes	☐	no	☐
Central call detail recording	yes	☐	no	☐
Central administration	yes	☐	no	☐
How many companies can be configured?	.....			
Which system resources can be shared?				
Subscriber lines	yes	☐	no	☐
Trunk connections	yes	☐	no	☐
Announcement devices	yes	☐	no	☐
Door openers	yes	☐	no	☐
Access to trunks (using codes, for example)	yes	☐	no	☐
Hotline destinations	yes	☐	no	☐

21.13.11 Call Detail Recording

Can call charges be displayed on digital telephones?	yes	☐	no	☐
Can a call charge computer with evaluation software be connected?	yes	☐	no	☐
Is service-specific call charge evaluation possible with various zoning/tariff levels?	yes	☐	no	☐
Telephony	yes	☐	no	☐
Fax	yes	☐	no	☐
Data	yes	☐	no	☐
Which storage media are used for recording call charges?				

POLOKWANE SOFTBALL STADIUM

Hard disk	yes	☐	no	☐
Other:				
.....				
Is a buffer available for storing call charge data?	yes	☐	no	☐
How many call data records can be buffered in the system's storage medium?	.....			
What output options are available for displaying or processing call data records?				
Display at subscriber terminal	yes	☐	no	☐
Display at attendant console	yes	☐	no	☐
External call charge computer	yes	☐	no	☐
Can call data records be provided for further evaluation for the following connection types?				
Outbound trunk calls	yes	☐	no	☐
Inbound trunk calls	yes	☐	no	☐
Is the selected carrier network saved with the call data record and provided for evaluation?	yes	☐	no	☐
Can distance zones be defined for a connection without the selected carrier's call charge information to calculate costs for the system operator?	yes	☐	no	☐
Can account codes (ACCT) for cost billing be entered for inbound or outbound traffic?	yes	☐	no	☐
Can ACCTs be entered during a call?	yes	☐	no	☐
Can the ACCT contain at least ten digits?	yes	☐	no	☐
21.13.12 Subscriber Features				
Can the display text language be individually set at the terminal?	yes	☐	no	☐
Can specific calls be picked up?	yes	☐	no	☐
Can multiple terminals be called at once by dialing a single number?	yes	☐	no	☐
Are multiparty teleconferences possible?	yes	☐	no	☐
How many parties per conference:	.....			
Can conferences also be initiated by an external party?	yes	☐	no	☐
Can the user get help with initiating and conducting a conference?	yes	☐	no	☐
Is the chained call forwarding function available at each system and in the network?	yes	☐	no	☐
How many call forwarding chains are permitted?	.....			
Can different call forwarding destinations be activated for variable call forwarding?	yes	☐	no	☐
Variable call forwarding for external calls?	yes	☐	no	☐
Variable call forwarding for internal calls?	yes	☐	no	☐
Can an inbound call be rejected?	yes	☐	no	☐
Intercom features:				
Is the "Speaker call" function available?	yes	☐	no	☐
Is the "Hands free answerback" function available?	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

Is the "Simplex calling" function available (one-way connection)?	yes	☐	no	☐
Can a subscriber set up a group call to up to 20 other terminals?	yes	☐	no	☐
Can subscribers access terminals with intelligent dialog control with plain-text information displayed for selecting available functions?	yes	☐	no	☐
Do the digital terminals with display have an integrated caller list?	yes	☐	no	☐
Is it possible to disable a terminal when quitting a workstation to prevent unauthorized access?	yes	☐	no	☐
Can subscribers with display access a central telephone directory?	yes	☐	no	☐
Can subscribers with display send text messages?	yes	☐	no	☐
Can subscribers with display leave an absence message?	yes	☐	no	☐
Can silent ringing be signaled for a subscriber with display?	yes	☐	no	☐
Do the digital terminals support the "Key functionality"?	yes	☐	no	☐
Do the terminals support the "Team functionality"?	yes	☐	no	☐
Are secretary system functions available?	yes	☐	no	☐
How many executive telephones are possible?				
How many secretary telephones are possible?				
Is an integrated two-way intercom system supported?	yes	☐	no	☐

21.13.13 Networking Communication Systems

Networking over Conventional Interfaces

Which digital lines can be used for communication system networking?

S ₀ dedicated line	yes	☐	no	☐
S _{2M} dedicated line	yes	☐	no	☐
Are any additional connection lines necessary, for example, for signal exchange?	yes	☐	no	☐
Do feature restrictions apply when using S ₀ dedicated lines as opposed to S _{2M} dedicated lines?	yes	☐	no	☐
Which D-channel protocols can be implemented for:				
S ₀ dedicated line?				
DSS1	yes	☐	no	☐
QSIG	yes	☐	no	☐
Other:	yes	☐	no	☐
S _{2M} dedicated line?				
DSS1	yes	☐	no	☐
QSIG	yes	☐	no	☐
Other:	yes	☐	no	☐
Do the various protocols available offer different ranges of functions?	yes	☐	no	☐
If yes, which?				
.....				

POLOKWANE SOFTBALL STADIUM

21.13.14 Networking over IP-Based Infrastructures

Does the system tendered support the networking of multiple systems over IP infrastructures?

yes ☐ no ☐

If so, which standards and functions are supported here?

E.164 – ISDN numbering scheme yes ☐ no ☐

Voice codec in accordance with ITU-T G.711 yes ☐ no ☐

Voice codec in accordance with ITU-T G.723 yes ☐ no ☐

Voice codec in accordance with ITU-T G.729AB yes ☐ no ☐

Voice codec in accordance with ITU G.722(for internal connections) yes ☐ no ☐

IETF DiffServ (RFC 2474) yes ☐ no ☐

Type of Service (TOS) in accordance with RFC 791 yes ☐ no ☐

IEEE 801.p yes ☐ no ☐

Open and closed numbering yes ☐ no ☐

Group 3 fax in accordance with ITU-T G.711 yes ☐ no ☐

Which protocols are supported by the IP interface?

PPP yes ☐ no ☐

PAP yes ☐ no ☐

CHAP (MSCHAP) yes ☐ no ☐

IPCP yes ☐ no ☐

PPPoE yes ☐ no ☐

PPTP yes ☐ no ☐

TCP/IP yes ☐ no ☐

UDP yes ☐ no ☐

FTP yes ☐ no ☐

TFTP yes ☐ no ☐

ICMP yes ☐ no ☐

Telnet yes ☐ no ☐

DHCP yes ☐ no ☐

RTP yes ☐ no ☐

SRTP yes ☐ no ☐

RTCP yes ☐ no ☐

H.225.0 yes ☐ no ☐

H.235 yes ☐ no ☐

H.245 yes ☐ no ☐

H323 yes ☐ no ☐

H.341 yes ☐ no ☐

H.450 yes ☐ no ☐

HTTP yes ☐ no ☐

HTTPS yes ☐ no ☐

Other?..... yes ☐ no ☐

What is the maximum number of connections supported per board?

POLOKWANE SOFTBALL STADIUM

Does the system feature integrated gatekeeper functions?	yes	☐	no	☐
If so, which functions are supported?				
Registration over RAS protocol (H.225)	yes	☐	no	☐
Address resolution	yes	☐	no	☐
Resource management	yes	☐	no	☐
H.235 Security Oscar Profile	yes	☐	no	☐
Is payload switching supported in the IP network?	yes	☐	no	☐
Is virtual system networking possible via VPN?	yes	☐	no	☐
How many VPN tunnels are supported?	.....			
What mechanisms are used to protect the VPN?				
Administration via SSL/TLS	yes	☐	no	☐
Protection of data transmission using IPSec (ESP tunnel mode) in accordance with IETF RFC – 2406	yes	☐	no	☐
Key management using the IKE protocol and Diffie-Hellmann Groups 1, 2, and 5	yes	☐	no	☐
Symmetrical encryption algorithms DES, 3DES, and AES	yes	☐	no	☐
HMAC algorithms HMAC-MD5 and HMAC-SHA1	yes	☐	no	☐
Public-key algorithms DAS and RSA	yes	☐	no	☐
Authentication using				
Multimedia Internet keying (Mikey 0)	yes	☐	no	☐
X.509v3 certificates	yes	☐	no	☐
Which certificates have been tested?				
.....				
.....				
Can a personal PKI be set up using integrated LWCA?	yes	☐	no	☐
Can teleworkers be connected via VPN Client?	yes	☐	no	☐

21.13.15 Functions in the Network

Can the following features be satisfied when using vendor-specific protocol:

Subscriber features with network-wide function	yes	☐	no	☐
Free station number assignment in the network with a closed numbering plan	yes	☐	no	☐
Station number assignment in the network with open numbering	yes	☐	no	☐
ISDN function network-wide	yes	☐	no	☐
Central administration	yes	☐	no	☐
Central network administration and maintenance	yes	☐	no	☐
Central attendant console	yes	☐	no	☐
Central call data recording	yes	☐	no	☐
Central call data evaluation	yes	☐	no	☐
Is the use of central application server possible network-wide?	yes	☐	no	☐
If so, which applications are available network-wide?				

POLOKWANE SOFTBALL STADIUM

.....

Can the network architecture be freely defined?

Meshed network yes ☐ no ☐

Star network yes ☐ no ☐

If not, what restrictions apply? Please explain:

.....

21.13.16 Heterogeneous Networks

Does the communication system tendered support the following QSIG/PSS1 features in TDM-based networks??

E.164 ISDN numbering scheme yes ☐ no ☐

Basic call yes ☐ no ☐

Hold yes ☐ no ☐

Consultation hold yes ☐ no ☐

Toggle yes ☐ no ☐

Recall yes ☐ no ☐

Intercept yes ☐ no ☐

Second call yes ☐ no ☐

Message waiting indication yes ☐ no ☐

Number transmission yes ☐ no ☐

Name transmission yes ☐ no ☐

Automatic callback on busy yes ☐ no ☐

Automatic callback on no answer yes ☐ no ☐

Call forwarding on busy yes ☐ no ☐

Call forwarding on no answer yes ☐ no ☐

Call forwarding, permanent yes ☐ no ☐

Call transfer yes ☐ no ☐

21.13.17 Features Available when Networking Systems from the Same Vendor

Is TDM-based networking possible using systems from the same vendor? yes ☐ no ☐

Which systems are supported?

.....

Which protocol is supported for TDM-based networking?

.....

Is IP-based networking possible using systems from the same vendor? yes ☐ no ☐

Which systems are supported?

.....

Which protocol is supported for IP-based networking?

.....

POLOKWANE SOFTBALL STADIUM

Which features are supported for TDM and IP-based networking?

Basic call	yes	☐	no	☐
Callback on busy	yes	☐	no	☐
Callback on no answer	yes	☐	no	☐
Call waiting	yes	☐	no	☐
Second call	yes	☐	no	☐
CLIP	yes	☐	no	☐
CLIR	yes	☐	no	☐
COLP	yes	☐	no	☐
COLR	yes	☐	no	☐
CNIP	yes	☐	no	☐
CNIR	yes	☐	no	☐
Call forwarding on busy	yes	☐	no	☐
Call forwarding on no answer	yes	☐	no	☐
Call forwarding, permanent	yes	☐	no	☐
Route optimization	yes	☐	no	☐
Message waiting indication (MWI)	yes	☐	no	☐
Toggle	yes	☐	no	☐
Call transfer	yes	☐	no	☐
Conference call	yes	☐	no	☐
Blind Transfer	yes	☐	no	☐
Emergency	yes	☐	no	☐
Direct media connection	yes	☐	no	☐
Callback to mailbox (with MWI)	yes	☐	no	☐

Can the tendered system be connected to other vendor-specific systems as part of a branch solution?

yes ☐ no ☐

If so, describe the design:

.....

Are all of the functions in the central system also available on the workstations in the branches?

yes ☐ no ☐

Can centrally available applications be used in the branches?

yes ☐ no ☐

Are IP telephones normally controlled by the central system?

yes ☐ no ☐

Can IP telephone connections be managed and administered centrally?

yes ☐ no ☐

Is the failure tolerance of IP work points guaranteed in the branches?

yes ☐ no ☐

Do IP telephones register automatically at the local gateway?

yes ☐ no ☐

Which subscriber lines are also supported by the gateway in the branch?

Fax connections yes ☐ no ☐

POLOKWANE SOFTBALL STADIUM

☐	Modem connections	yes		
☐	no			
	Analog telephones	yes	☐	no ☐
Which numbering plans are supported?				
	Closed numbering	yes	☐	no ☐
	Open numbering	yes	☐	no ☐

21.13.18 Networking with the Session Interaction Protocol (SIP)

Is there support for a Gateway function on SIP basis?	yes	☐	no	☐
Which scenarios are supported by the SIP Gateway?				
Use as PSTN Gateway for SIP-based communication servers?	yes	☐	no	☐
Use as PSTN Gateway for directly connected SIP terminals?	yes		☐	
no ☐				
Use as Survivability Gateway?	yes	☐	no	
☐				
Use as TDM Gateway?	yes	☐	no	☐
Which SIP functions are supported?	yes	☐	no	☐
Basis services	yes	☐	no	☐
Caller Line Identification Presentation	yes	☐	no	☐
Which functions are certified:				

.....

.....

21.13.19 Synchronizing the Network

Synchronization is a prerequisite for digital network operation and requires the fulfillment of certain physical and technical boundary conditions.

Can the system tendered be operated automatically?	yes	☐	no	☐
Can the system tendered synchronize with a clock?	yes	☐	no	☐
On which interface can the system perform synchronization?				
S _{2M} primary rate connection to the trunk	yes	☐	no	☐
S _{2M} tie trunk	yes	☐	no	☐
S ₀ trunk	yes	☐	no	☐
S ₀ tie trunk	yes	☐	no	☐
Is system/network synchronization compliant with the recommendations or standards issued by the committees listed below (including jitter/input and output converter requirements)?				
ITU-T	yes	☐	no	☐
ETSI	yes	☐	no	☐
ISO	yes	☐	no	☐
How many interfaces can be configured as references?				
One digital interface	yes	☐	no	☐
More than one digital interface	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

All digital interfaces	yes	☐	no	☐
Does the standby reference automatically activate when the current interface fails?	yes	☐	no	☐
Does the system automatically revert to the original interface when the fault is resolved?	yes	☐	no	☐
How are references selected?				
Please explain:				
Is the system clock signaled on the digital interfaces?	yes	☐	no	☐
Is clock accuracy maintained for cordless DECT?	yes	☐	no	☐
Is the clock module also necessary for tie networking? ☐	yes	☐	no	
Is the clock module also necessary for IP networking? ☐	yes	☐	no	
21.13.20 Least Cost Routing (LCR) and Route Optimization				
Can least cost routing be performed for voice and data connections on the basis of the station number?	yes	☐	no	☐
Can trunk calls in the private network be routed to the public network at the most cost-effective point?	yes	☐	no	☐
Does the system try to select a new path when connections routed over LCR get blocked (for example, following a congestion signal)?	yes	☐	no	☐
Can all transit nodes involved in connection setup in the network initiate another path selection attempt on the connection setup path to the original node (A station)?	yes	☐	no	☐
Can subscribers be assigned LCR privileges for the LCR function?	yes	☐	no	☐
Can external calls be routed to different carriers depending on the time of day and week?	yes	☐	no	☐
Is the user informed about the modified call charge tariffs applicable in the event of capacity-related break-out into third-party networks?	yes	☐	no	☐
By an advisory on the display (<i>digital stations</i>)	yes	☐	no	☐
By an acoustic signal (<i>analog stations</i>)	yes	☐	no	☐
Is least cost routing performed in the network after a connection has been transferred or picked up following a consultation call or after a connection has been routed further by the attendant console?	yes	☐	no	☐
21.13.21 Virtual Networking				
Are IPSec encryption and authentication mechanisms supported?	yes	☐	no	☐
Is there a guarantee that the following scenarios will be protected against attacks from outside and are thus private?				
Branch networks	yes	☐	no	☐
Access for teleworkers	yes	☐	no	☐
Are the following mechanisms guaranteed for protection?				
Secure administration via SSL/TLS	yes	☐	no	☐
Protection of data transmission via IPSec (ESP tunnel mode)	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

Key management with IKE protocol and Diffie-Hellmann Groups 1,2, and 5	yes	☐	no	☐
Symmetrical encryption algorithms DES, 3DES, and AES	yes	☐	no	☐
HMAC algorithms HMAC-MD5 and HMAC-SHA1	yes	☐	no	☐
Public-key algorithms DSA and RSA	yes	☐	no	☐
Authentication using MIKEY 0 or X.509v3 certificates	yes	☐	no	☐
Set up a personal PKI through integrated Light Weight Certification Authority (LWCA)	yes	☐	no	☐
Connection of teleworkers via SafeNet Sentinel VPN Client	yes	☐	no	☐
Can branch networks be connected to the Internet via				
a dedicated Internet connection	yes	☐	no	☐
xDSL	yes	☐	no	☐
In the case of remote access, can mobile staff connect via an				
analog line	yes	☐	no	☐
ISDN line	yes	☐	no	☐
ADSL line	yes	☐	no	☐

21.13.22 Local Management Tool in Standalone Systems

Is a management tool available? yes ☐ no ☐

Name:.....

Management tool

Where is the relevant data stored?

Only in the communication servers	yes	☐	no	☐
Only in the network management system	yes	☐	no	☐
Distributed across the communication server and network management system	yes	☐	no	☐

Management tool access to the communication server

How does the management tool access the communication server?

Online access	yes	☐	no	☐
File transfer	yes	☐	no	☐

Which management functions are available?

Configuration Management	yes	☐	no	☐
Least Cost Routing Administration	yes	☐	no	☐
Accounting Management	yes	☐	no	☐
Security Management	yes	☐	no	☐

Management tool user interface

How is the management tool's user interface laid out?

With mask technology (alphanumeric)	yes	☐	no	☐
With window technology (graphical and Web-based)	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

With object-oriented, graphical user interface	yes	☐	no	☐
Configuration Management	yes	☐	no	☐
Are standard layouts available for administration?	yes	☐	no	☐
Which functions are supported?				
Creating new subscribers	yes	☐	no	☐
Modifying subscribers	yes	☐	no	☐
Deleting subscribers	yes	☐	no	☐
Moving subscribers	yes	☐	no	☐
Is input consistency automatically checked?	yes	☐	no	☐
Can sample subscribers be set up?	yes	☐	no	☐
Are tables/overviews available :				
Classes of service	yes	☐	no	☐
Speed-dialing number list	yes	☐	no	☐
Key layouts	yes	☐	no	☐
Station numbers and PENs	yes	☐	no	☐
Notification texts	yes	☐	no	☐
Group relationships, such as				
Hunt group	yes	☐	no	☐
Executive/secretary	yes	☐	no	☐
Call pickup groups	yes	☐	no	☐
Is LCR table administration possible?	yes	☐	no	☐
Is the administration of cordless board, base station and cordless stations possible?	yes	☐	no	☐
Which features can be configured for each subscriber?				
Override authorization	yes	☐	no	☐
Associated dialing/services	yes	☐	no	☐
Call waiting rejection	yes	☐	no	☐
Override do-not-disturb	yes	☐	no	☐
Display missed calls list	yes	☐	no	☐
External CF permitted	yes	☐	no	☐
Entry in telephone directory	yes	☐	no	☐
Prevention of voice calling	yes	☐	no	☐
Code lock intercept	yes	☐	no	☐
DISA authorization	yes	☐	no	☐
Consultation call prevention	yes	☐	no	☐
Answer group on busy	yes	☐	no	☐
Central busy signal	yes	☐	no	☐
Station types	yes	☐	no	☐
Code lock	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

Assignment and configuration of call forwarding – no answer destinations for subscribers and groups	yes	☐	no	☐
Assignment and configuration of toll restrictions for each route for all subscribers	yes	☐	no	☐
Assignment and configuration of groups and hunt groups	yes	☐	no	☐

Accounting Management/Telephone Management System

Which functions are supported?

Call data recording	yes	☐	no	☐
Service use recording	yes	☐	no	☐
Cost calculation based on:				
Subscriber and organization unit	yes	☐	no	☐
Destination address	yes	☐	no	☐
Carrier/provider	yes	☐	no	☐
Private/business	yes	☐	no	☐
Data source (TC, IP, mobile address)	yes	☐	no	☐
Zones	yes	☐	no	☐
Call charge units	yes	☐	no	☐
Are standard forms available for call charge records?	yes	☐	no	☐
Can customer-specific forms be created?	yes	☐	no	☐
Are graphical reports and lists available?	yes	☐	no	☐
Can report creation be scheduled?	yes	☐	no	☐
Can report transmission be automated (e-mail)?	yes	☐	no	☐

Security Management

Which functions are supported?

Administration of personal access privileges	yes	☐	no	☐
Logging access sessions (logbook)				
logon/logoff	yes	☐	no	☐
job	yes	☐	no	☐
Evaluation of access logs	yes	☐	no	☐

Connection to superior network management systems

yes ☐ no ☐

21.13.23 Attendant Console on PC Basis

Which operating system is supported?

Windows Vista	yes	☐	no	☐
Windows XP	yes	☐	no	☐
Windows 7	yes	☐	no	☐

Does the attendant console continue to work if the screen fails?	yes	☐	no	☐
Can the PC be used at the same time, for example, for processing text?	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

Can the attendant console functions also be activated with the mouse?	yes	☐	no	☐
Are adjustable local settings available (volume, Windows screen settings, etc.)?	yes	☐	no	☐
Can several attendant consoles be networked over a LAN?	yes	☐	no	☐
How many attendant consoles can be connected simultaneously to a single node?				
Is an electronic telephone directory integrated in the attendant console display?	yes	☐	no	☐
Are multiple fields available to the attendant operators for entering each name?	yes	☐	no	☐
Can direct searches be performed for entries, such as name, station, number, keyword?	yes	☐	no	☐
Does a search start as soon as a letter is entered?	yes	☐	no	☐
Can a connection be set up directly from the search window?	yes	☐	no	☐
What other equipment/applications are available for the attendant console?				
Operation by the visually impaired	yes	☐	no	☐
Simultaneous operation by sighted also possible	yes	☐	no	☐
Screen contents and LED status display on Braille module	yes	☐	no	☐
Other equipment:				
Is there a functional unit (for example, a screen and a keyboard) available for the entire attendant console functionality?	yes	☐	no	☐
Can the layout selection be customized?	yes	☐	no	☐
Does the attendant console support multiple operating languages?	yes	☐	no	☐
If so, how many languages are possible?				
Is real-time display available for queued calls?	yes	☐	no	☐
Is the "Busy lamp field" function available as a software application?	yes	☐	no	☐

21.13.24 Integrated Entry Voice Mail System

Is the voice mail system:				
integrated in the system?	yes	☐	no	☐
adapted in the system?	yes	☐	no	☐
Is a call to the mailbox forwarded if the subscriber activates call forwarding?	yes	☐	no	☐
How is the mailbox owner informed about saved messages?				
Signaled by LED	yes	☐	no	☐
Signaled by text	yes	☐	no	☐
Are both signaling variants simultaneously available to the subscriber?	yes	☐	no	☐
Can the mailbox owner:				
browse the mailbox if multiple messages are saved?	yes	☐	no	☐
tell from the status when the message reached the recipient?	yes	☐	no	☐
What kind of user prompts are provided at the telephone to assist the mailbox owner?				

POLOKWANE SOFTBALL STADIUM

Acoustic user prompts	yes	☐	no	☐
Are multiple operating languages available?	yes	☐	no	☐
If so, which?				
Are automatic attendant mailboxes available?	yes	☐	no	☐
Can personal mailbox settings be modified from an external telephone?	yes	☐	no	☐
How many greetings can be selected?	Number:			
.....				
Is it possible to automatically switch between greetings?	yes	☐	no	☐

21.13.25 Integrated Voice Mail System

Is the voice mail system:				
integrated in the system?	yes	☐	no	☐
adapted in the system?	yes	☐	no	☐
Is a call to the mailbox forwarded if the subscriber activates call forwarding?	yes	☐	no	☐
Is the mailbox owner informed about saved messages?				
Signaled by LED	yes	☐	no	☐
Signaled by text	yes	☐	no	☐
Are both signaling variants simultaneously available to the subscriber?	yes	☐	no	☐
Acoustic signaling	yes	☐	no	☐
Can subscribers also be informed about saved messages via user outcalls to other or external connections?	yes	☐	no	☐
Can mobile telephones be used for signaling?	yes	☐	no	☐
Can pagers be used for signaling?	yes	☐	no	☐
Can the mailbox owner:				
browse the mailbox if multiple messages are saved?	yes	☐	no	☐
create a distribution list and send messages to the distribution list?	yes	☐	no	☐
tell from the status when the message reached the recipient?	yes	☐	no	☐
What kind of user prompts are provided at the telephone to assist the mailbox owner?				
Acoustic user prompts	yes	☐	no	☐
Are multiple operating languages available?	yes	☐	no	☐
If so, which?				
.....				
Are automatic attendant mailboxes available?	yes	☐	no	☐
Can all available features be enabled on a mailbox-specific basis?	yes	☐	no	☐
Can personal mailbox settings be modified from an external telephone?	yes	☐	no	☐
Can the system also be implemented as a professional music-on-hold device?	yes	☐	no	☐
Can the system also be implemented as a professional announcement device?	yes	☐	no	☐

POLOKWANE SOFTBALL STADIUM

Does the voice mail system supports mobility function for GSM-phones?	yes	☐	no	☐
Which function are realized?	yes	☐	no	☐
One Number Service (incoming and outgoing calls)	yes	☐	no	☐
Single Voice Mail for Desktop and GSM-phones	yes	☐	no	☐
Home Office Integration	yes	☐	no	☐
Acoustic menu navigation	yes	☐	no	☐
CLIP identification	yes	☐	no	☐
PIN identification	yes	☐	no	☐

21.13.26 Computer Telephony Integration (CTI)

Computer-Supported Telephony Application (CSTA)

Can the communication server tendered be connected to client/server environments for the implementation and utilization of CTI solutions?	yes	☐	no	☐
Is a central CTI application platform available for the system tendered?	yes	☐	no	☐
Can the CTI application platform be physically connected over LAN/Ethernet (TCP/IP)?	yes	☐	no	☐
Can the CTI application be physically connected to a system telephone over a USB interface?	yes	☐	no	☐
Does the communication server tendered support API standards for the implementation and utilization of third-party CTI solutions?	yes	☐	no	☐
Are the following third-party CTI-API standards/industry standards supported:				
Microsoft TAPI 120 V2	yes	☐	no	☐
Microsoft TAPI 170 V2	yes	☐	no	☐
CSTA	yes	☐	no	☐
XML	yes	☐	no	☐
JTAPI	yes	☐	no	☐
Are CTI solutions available for the following fields of activity?				
Call center solutions	yes	☐	no	☐
CTI Desktop solutions	yes	☐	no	☐
Teleworking solutions	yes	☐	no	☐
Other:	yes	☐		
no				

Are CTI solutions available for the following workstation environments?

Microsoft Outlook	yes	☐	no	☐
Lotus Notes	yes	☐	no	☐
Browser (Web-based)	yes	☐	no	☐
Other:	yes	☐		

POLOKWANE SOFTBALL STADIUM

21.13.27 Integrated Router Function

Does the communication system tendered feature an integrated router board?	yes	☐	no	☐
Does this board support the following properties?				
Remote LAN access	yes	☐	no	☐
LAN-LAN connection over ISDN dial-up lines	yes	☐	no	☐
ADSL connection (T-DSL)	yes	☐	no	☐
SDSL connection	yes	☐	no	☐
Can multiple B-channels be bundled over a LAN-LAN connection?	yes	☐	no	☐
Can channels be bundled dynamically?	yes	☐	no	☐
How many channels can be bundled together?	.....			
Is Internet access possible?	yes	☐	no	☐
Is a dynamic reference of the IP address from the Internet provider possible?	yes	☐	no	☐
Can the Internet be accessed over one of the Internet provider's IP addresses?	yes	☐	no	☐
Is channel bundling (B-channel allocation) possible	yes	☐	no	☐
dynamic switching	yes	☐	no	☐
statically defined	yes	☐	no	☐
Does the router board support the following protocols for subscriber authentication?				
PAP (Password Authentication Protocol)	yes	☐	no	☐
CHAP (Challenge Handshake Authentication Protocol)	yes	☐	no	☐
MS-CHAP (Microsoft-CHAP)	yes	☐	no	☐
Are firewall mechanisms available on the board?	yes	☐	no	☐
Which of the following mechanisms are supported:				
ISDN station number verification	yes	☐	no	☐
Automatic callback without setting up a toll ISDN call	yes	☐	no	☐
IP address verification	yes	☐	no	☐
MAC firewall (verification of the combination MAC/IP address in the internal LAN)	yes	☐	no	☐
Port filtering	yes	☐	no	☐
Are the following interfaces available on the board?				
10/100 megabits	yes	☐	no	☐
10/100 megabits (DSL with PPPoE/PPTP)	yes	☐	no	☐
Are the following protocols supported?				
SNMP	yes	☐	no	☐
PPP	yes	☐	no	☐
Can short-hold mode be set for a PPP connection?	yes	☐	no	☐
Can the short-hold mode be blocked for a flat-rate PPP connection?	yes	☐	no	☐
PPP Multilink protocol	yes	☐	no	☐
Can multiple B channels be bundled for a PPP connection?	yes	☐	no	☐
How many channels can be bundled?	.....			

POLOKWANE SOFTBALL STADIUM

PPPoE	yes	☐	no	☐
PPTP	yes	☐	no	☐
Is there an option for setting Network Address Translation (NAT)?	yes	☐	no	☐
Is V.34 to V.90 supported for analog remote access?	yes	☐	no	☐
Is V.110 bit rate adaptation supported for remote access over GSM?	yes	☐	no	☐
Do connected voice telephones support dialing from an existing LDAP telephone directory or database?	yes	☐	no	☐
If so, which telephones support dialing?				

Integrated mobility solution

Does the communication server support solution to integrate GSM mobile phones?	yes	☐	no	☐
Which features are possible				
One Number Service	yes	☐	no	☐
Parallel ringing (internal and mobile phone)	yes	☐	no	☐
Busy Display	yes	☐	no	☐
DISA functionality	yes	☐	no	☐
Are mobility clients as an additional option available?	yes	☐	no	☐

Cordless System

Is an integrated multicell / multistation cordless system based on the DECT standard available?	yes	☐	no	☐
Does the communication system tendered support the following system features:				
Flexible, requirement-based equipment of base stations with voice channels?	yes	☐	no	☐
Integration in the communication server administration and maintenance concept?	yes	☐	no	☐
Roaming and handover in the communication server	yes	☐	no	☐
Roaming in the network	yes	☐	no	☐
Can a telephone directory stored in a mobile unit be provided centrally so that it can be made available to other mobile units?	yes	☐	no	☐
Can different base stations be operated in mixed mode at a cordless board?	yes	☐	no	☐

Teleworking/Teleworkstations and Desk Sharing for IP Softphones

Can teleworkstations be implemented with the system?	yes	☐	no	☐
Does the architecture support network-independent operation of teleworkstations?	yes	☐	no	☐
Can the subscriber use the same login name and the same password for the office workstation and the teleworkstation?	yes	☐	no	☐
Can the corporate LAN be accessed transparently?	yes	☐	no	☐
Is access to data/voice functions assured?	yes	☐	no	☐
If so, which mechanisms ensure this?				

POLOKWANE SOFTBALL STADIUM

Verification of MAC or IP addresses	yes	☐	no	☐
TCP, UDP and ICMP port firewall	yes	☐	no	☐
Access verification based on ISDN call numbers	yes	☐	no	☐
Automatic callback	yes	☐	no	☐
PAP (Password Authentication Protocol)	yes	☐	no	☐
CHAP (Challenge Handshake Authentication Protocol)	yes	☐	no	☐
MSCHAP (Microsoft Challenge Handshake Authentication Protocol)	yes	☐	no	☐
If the IP Softphone fails, can incoming calls be forwarded to an alternative destination (e.g. mobile phone number)?	yes	☐	no	☐
Do mobile IP users have an "emergency number" function which dials a specific emergency number at their permanent location?	yes	☐	no	☐
If yes, how it is implement:	.....			

21.13.28 Encryption

Are mechanisms available for encrypting voice transmissions via IP-based infrastructures?	yes	☐	no	☐
Is signaling encryption supported?	yes	☐	no	☐
Is payload encryption supported?	yes	☐	no	☐
Is encryption available on all connected IP terminals?	yes	☐	no	☐
Are there any restrictions:	.....			

22 PABX AND PERIPHERAL EQUIPMENT

The Contractor shall obtain the services of an approved company specialising in PABX systems for the supply, installation and commissioning of the complete PABX / telephone installation as specified.

22.1 Overview of Requirements

- 22.1.1 This Specification covers the complete supply, delivery, installation, testing, commissioning and maintenance of an ISDN compatible, digital, electronic Private Automatic branch Exchange, and Telephone management System for the ZDM Ulundi (hereinafter referred to as an PABX).
- 22.1.2 Tenderers are to include, whether specified in detail or not, all equipment, material, labour and expenses for the erection, testing and commissioning of PABX System in accordance with this Specification and relevant Telkom Schedule of Requirements.

POLOKWANE SOFTBALL STADIUM

- 22.1.3 The Telkom Schedule of Requirements shall be read in conjunction with and forms part of this tender document or the Telkom Request for Service.
- 22.1.4 The Tenderer is to submit all necessary applications to Telkom S.A. to satisfy their requirements and make all necessary arrangements with Telkom for the satisfactory conclusion of the contract.
- 22.1.5 Preference will be given to systems, which afford flexibility, economy and efficiency of expansion.
- 22.2 **Compliance with Specification**
- 22.2.1 Unless a departure from the specifications and conditions is clearly stated by the Tenderer at the time of tendering, the offer shall be taken as complying in detail with the Specification. The successful Tenderer shall therefore be held liable on all terms and conditions contained herein. Any proposed variation/amendment shall be accepted/rejected at the sole discretion of the Client.
- 22.2.2 All equipment/material delivered in accordance with this tender shall be NEW, fully complying with the Telkom Specification of Requirements.
- 22.3 **Technical - General**
- 22.3.1 The PABX shall be system approved by ICASA. Tenderers shall provide proof that a Telkom licence exists for the tendered PABX.
- 22.3.2 Tenderers shall include, in duplicate, a Certificate of Compliance detailing equipment quantities, traffic and power calculations, brand and model relating to PABX/Battery and charger, as required by Telkom.
- 22.3.3 The offered system must be capable of meeting the traffic requirement as specified by Telkom SOR.
- 22.3.4 All environmental conditions must be accounted for in the contractor's proposal such as air conditioning, electrical and physical requirements.
- 22.4 **PABX**
- 22.4.1 The system shall employ the latest technology processor.
- 22.4.2 The PABX shall provide for a RS232 port to which a telephone monitoring system can be connected, as well as multi-nodal monitoring if required. The system software shall generate data relating to both incoming, outgoing and internal calls for processing by the telephone monitoring system, via RS232/ port
- 22.5 **Battery Back-Up**
- 22.5.1 The PABX will be connected to the building UPS power.
- 22.6 **Cabling Network**

POLOKWANE SOFTBALL STADIUM

- 22.6.1 The contractor to supply all underground piping/sleeves for Telephone cabling.
- 22.6.2 All telephones (including feature telephones, executive telephones, etc.) shall be connected by means of a two-wire cable, all of the above shall be system powered and not require any local power supplies.
- 22.6.3 All cabling must be new and of the type CAT5 E. Cabling installation shall be by the Cable Networking Specialist contractor. Cable network to be shared by Computer Network and PABX installation.
- 22.6.4 The PABX must be able to withstand lightning induced voltage surges on the exchange lines between lines and also line to earth for each leg in compliance with the latest issue of Telkom's Standard Specification for Private Branch Exchanges. Lightning protection shall therefore be fitted on the M.D.F. for all exchange lines, tie lines and outdoor extension lines.

22.7 Trunk Requirements

- 22.7.1 The system must be ISDN compatible. Supply details of ISDN Basic Rate Access (BRA) and Primary Rate Access (PRA).
- 22.7.2 The system must be able to accommodate at least 13 analogue Trunks (i.e. Cellular Routers, Fax machines and modems)
- 22.7.3 The system must be able to do LCR (Least Cost Routing) / ASR (Automatic Route Selection).

22.8 Telephone Instruments

- 22.8.1 Only Telkom approved standard, analogue, DTMF telephone instruments may be used.
- 22.8.2 Feature telephones must amongst others, incorporate the following features:
- 12 digit keypad with standard features;
 - be system powered;
 - use a two wire cable;
 - full "hands free operation"; i.e. on hook dialling, listening in loudspeaker and communal microphone, with key activation and LED;
 - microphone mute key;
 - audible ring tone and volume selection adjustment;
 - 10 one touch speed dial repertory keys;
 - LCD display showing messages, extension of incoming calls, date, time etc.;
 - Function keys to access system features;
 - Full single or multiple executive/secretary operating;
 - Ability to connect add-on module of twenty or more repertory dialled keys;

22.9 Negotiations with Telkom

- 22.9.1. The Contractor shall provide the initiative for negotiations with Telkom to obtain all necessary approvals for the PABX installations.

22.10 Control Unit must make provision for the following:

- 1 Primary Rate ISDN line (30 channels)
- 12 Analogue incoming line ports for back-up and cell phone routers (Quantity of routers to be established after 3 months of operation).
- At least 100 analogue extension ports for ±80 (SLP) Single Line Phones, industrial type (extension phones, faxes, analogue modems & voicemail).
- At least 12 digital extension ports for operators console, executive phones and Cli, for Senior Personnel Offices, Level 3.
- ISDN end to end (So BUS): Video conferencing, ISDN telephones, G4 fax.
- ARS - Automatic Route Selection for cell phone routers & other service providers with at least 5 time zones.
- Remote maintenance modem.
- At least 10 barring levels per telephone.
- At least 5 party conference.
- Intrude and monitor functions.
- Call forwarding including off-net.
- Message waiting lights on all digital phones.
- Programmable from PC, touchtone digital phone and remote access modem.
- DDI - Direct Dialling Inwards to all relevant extensions.
- CLI - Calling Line Identification to all LC display digital phones.
- Modular design.
- Intrude and monitor functions.
- All basic functions of PABX's must apply.
- UCD and ACD - Uniform Call Distribution and Automatic Call Distribution

22.11 System must fully support the following:

- DECT-GAP (Digital Enhanced Cordless Telephony & General Application Protocol).
- 20% expansion capability within cabinet as supplied.
- All the latest transport modes of voice and data.
- Q-SIG
- Call centre
- CTI - Windows Telephony (Microsoft TAPI)

22.12 Voice Mail to make provision for the following:

- Modular design not PC based
- Transparent integration with PABX
- At least 4 ports
- In-Band DTMF protocol and RS232 (SMDI) serial port.
- Features: Automated Attendant
Voice Mail
System / Administration
- Call Recording
- Customised greetings & Language per mailbox
- Message retrieve, save, copy, delete, forward.
- Date & Time stamp
- Password protection
- PC and touch tone phone programmable.

(a) Automated Attendant to make provision for the following:

POLOKWANE SOFTBALL STADIUM

- Opening greetings for different operating modes - day, night, holiday, break.
- Automatic mode system schedules
- Call transfer: supervised, semi-supervised, non-supervised.
- Default transfer to operator.
- Directory listing (dial by name).
- Fax detection and routing
- Direct dialling to extensions
- Greeting by port
- Answer on first ring.
- Audio Text.

22.13 **Management System must make provision for the following:**

- Instant reports.
- E-mailing for reports via Microsoft Outlook.
- Automatic e-mailing of unauthorised calls.
- Multiple level password protection.
- Unlimited database size.
- Networking multiple sites together via LAN, WAN and Internet.
- 20 000 account codes.
- 2 000 extensions.
- 2 000 client list names.
- Extension summary / detail reports.
- Dept. summary / detail report.
- Top 38 / 120 / 300 reports by cost, duration, number dialled.
- Client list report
- Account code reports
- Graphs.

22.14 **Maintenance**

- 22.14.1 The PABX shall be fitted with a modem (to be included in the tender price) for remote interrogation from the suppliers' service centre via the public network to facilitate fault diagnosis and facility changes. Entry shall be protected by special password.
- 22.14.2 The contractor shall have technical staff and spares available in The Area. The contractor must be able to respond within two hours after - notification of a major system failure.
- 22.14.3 The PABX shall be guaranteed by the Contractor against faulty components, materials, poor workmanship and/or design, fair wear and tear excepted, for a period of twelve (12) months from date of first delivery of the complete project.
- 22.14.4 The Contractor shall, accordingly, for the period of validity of this guarantee, replace equipment, which has failed due to faulty components, materials, poor workmanship and design at no cost to the Client.
- 22.14.5 On expiry of the guarantee period, the Contractor will, should he be called upon to do so, enter into a Maintenance Agreement with the client. The Agreement shall include all items of equipment supplied under this contract. A pro forma Maintenance Agreement shall be included.

POLOKWANE SOFTBALL STADIUM

22.14.6 Tenderers shall undertake to provide spares and back up maintenance support for at least ten (10) years from date of commissioning.

22.15 Documentation

22.15.1 If required, two complete sets of technical manuals (on CD) shall be delivered with the PABX.

22.15.2 OPERATORS MANUAL

The operator's manual shall be separate from the technical manual. This manual shall include the operating instructions in a systematic and logical step-by-step sequence. A manual shall be delivered for each attendant's console.

22.15.3 USER MANUAL

One instruction card shall be provided for each extension telephone.

22.15.4 MANUALS – GENERAL

All manuals shall be supplied at no additional charge to the client and prior to commissioning of the PABX.

22.16 Training

Suitable on-site training shall be given to all extension users and operators prior to commissioning, at no additional charge to the client.

22.16.1 Tenderers shall state their willingness to provide first line maintenance training for two persons to enable the client to undertake facility changes.

22.17 General

- The system offered shall at the time of tendering appear on the Telkom list of approved systems. Only the latest technology will be considered.
- System must be fully integrated into and capable of utilising CAT 5 enhanced network cabling with all its inherent features and benefits.
- Cost of expanding system either on incoming or extension side to be shown clearly indicating amount of ports per expansion.
- Cost of maintenance contract to be indicated including escalation and exclusions.
- The PABX System shall be Siemens / Plessey / Telkom or other approved and shall be installed by a Specialist Contractor.

24 MECHANICAL EQUIPMENT

POLOKWANE SOFTBALL STADIUM

The electrical sub-contractor is to co-ordinate with the mechanical sub-contractor for the power supply and positioning of all the mechanical equipment. This will entail the following:

The position of isolators

The correct cable / wire sizes.

The connection of this equipment.

25 CCTV AND DIGITAL VIDEO RECORDING SYSTEM

The scope of works is for the supply and installation of CCTV cameras with Digital Recording for security at the Facility. The system will comprise cameras mounted in the suspended ceiling tiles at opposite corners of the boardroom to enable recording of all the activity in the room. The digital recorder shall be a retrofit P.C. card and shall have a minimum of four composite video inputs. The card will be installed in the main server P.C. which is to be placed in the administration office. The cameras shall be of the colour type.

The cameras and recorder must have the following minimum specification,

CAMERA

Lens	:	3 mm F/2.0
Voltage Range	:	12 to 28 VAC or VDC
System	:	PAL
Imager	:	Interline transfer CCD; 1/4-inch image format.
Horizontal Resolution	:	470 TV Line
Signal to noise ratio dB	:	(Min. AGC), >46 dB >48 dB, AGC: 18 20 dB
Sensitivity	:	(3200 K)
Usable Picture	:	(50IRE) Full Video
Scene illumination	:	4.5 lux (0.45 fc), 22 lux (2.2 fc), F/2 lens, 89.9% scene reflectance.
Electronic Shutter sec.	:	PAL/CCIR Models: 1/50 to 1/100,000
White Balance	:	Continuous Tracking (ATW): 2500 K to 9000 K. White Balance Store (AWB): 2500 K to 9000 K.
Video Output	:	1.0 Vpp, 75 ohm.
Synchronization	:	Line-lock (when powered by AC): Synchronizes camera to power line zero crossing for roll-free vertical interval switching. Vertical phase delay can be externally adjusted (continuously) to allow vertical synchronization in multiphase power installations.
Controls	:	Line-Lock Selectable On/Off. Phase Adjust Aange 330°, White balance ATW or AWB (colour models only), Backlight Compensation On/Off.
Connectors	:	Video Out BNC.

POLOKWANE SOFTBALL STADIUM

Power Terminals : Power supply terminals are isolated from video output BNC.

Mechanical

Cable Entry Internal connections.
Mounts on wall or ceiling.

Adjustable viewing position : Horz; 70° Vertical; 360° Rotation.
Viewing angle : 3mm lens - 53° Horz., 38° Vert.
Construction/Finish : Polycarbonate (PC) dome on molded PC/ABS housing.
Dimensions : 115 mm (4.5 in) diameter x 77 mm (3 in) height.
Weight : 0.4 kg (0.9 lb).

Environmental

Rated for indoor use.
Operating Temperature -10 °C to +45 °C
(+14 °F to +113 °F)

DIGITAL VIDEO RECORDER

4 Composite Video Channels
Dynamic Frame Rate Recording
Single Channel Audio Recording
Advanced Motion Detection
Digital Signature for Evidence purposes
Audit Log
Remote viewing over TCP/IP
Operates under Windows 2000 or XP Pro
Automatic backup with network support
Direct CD and DVD burning
P.C. minimum requirements, (for 4 channel system) Intel Celeron 1,2 Ghz, 2GB MB RAM, 32 MB AGP Display, 160 GB HDD, DVD/CD Writer.

THE CAMERAS ARE TO BE BOSCH "FLEXIDOME" OR SIMILAR AND THE RECORDER IS TO BE THE EAGLE DVR-4 OR SIMILAR.

26

ACCESS CONTROL

The successful tenderer shall obtain the services of an approved company specialising in Access Control installations to install a system that complies with the specification.

The access control system comply to the following minimum requirements:-

- Display/ record Identification of person entering and time of entry.
- Support up to 200 tags.
- Four tag levels: Administrator, Supervisor, Normal and Visitor.
- Control of up to 16 doors, or 15 doors and up to 4 lifts/ elevators.
- Up to 16 Anti-Passback zones.
- Provides access Patterns, enabling the access requirements for a given tag to be specified according to time and day and door/ lift floor.
- Stores the most recent 8000 transactions.
- Daily Door Mode Patterns which determine access status at

POLOKWANE SOFTBALL STADIUM

specified times: Tag required, Locked, Open, Supervisor Unlock, No Entry.

- Dual Tag option.
- Duress codes.
- Option of Tag Only, Tag + PIN code, or Tag + PIN code + Reason code for access.
- Three Anti-Passback Modes – Off, Relaxed, Strict.
- Anti-Passback Lockout
- Provides Messaging capabilities: (up to 256 predefined messages can be linked to tags and displayed at LCD – equipped readers).
- Timed Triggered Actions with digital input feedback.
- Input Event Triggered Actions with digital input feedback.
- Intrusion Alarm and Alarm Panel Arming facilities OR Power Control Output.
- System can be upgraded to a fully functional IXP300 (ImproNet) system.
- Open InterBase database allows integration of 3rd party software.
- On-line dynamic Language Translation facility.
- Supports standard ImproX Read Only tags and ImproX Hardware or other approved.
- Firmware upgrade capabilities.

The following does not form part of the scope of work for this installation.

- Pentium P3 or better computer with printing facility (minimum requirements).
- 220 Volt power outlets within 3 meters of all control points.
- Conduit installation.

The access control installation shall be type IXP 200 series controller and software or other approved and shall include all system hardware, cabling, labour, accessories, travel and accommodation.

27 PASSIVE SECURITY ALARM

27.1 SCOPE

- 27.1.1 This specification covers the supply, delivery and installation of a passive infrared intruder detection system for the New uMkhanyakude Abattoir.
- 27.1.2 The installation shall comprise passive infrared (PIR) detectors installed as indicated on the relevant drawings, a control unit, keypad, magnetic reed type detectors on the doors and electronic sirens.
- 27.1.3 The conduit for the detection installation is specified under the electrical section of this document.

27.2 SUPPLY

- 27.2.1 The power supply of the system shall operate off a nominal 230V 50Hz single phase supply. A 16 ampere switched socket outlet is provided in the electrical section of this document for this purpose.
- 27.2.2 The output of the power supply shall be a nominal 12 V (PC) supply, which shall be wired to the keypad and detectors as necessary.

POLOKWANE SOFTBALL STADIUM

- 27.2.3 The power supply, which shall be integral with the control unit, and shall incorporate a double-wound isolating transformer.
- 27.2.4 The control unit shall have a sealed lead acid battery with gel-type electrolyte, with sufficient capacity to provide power for 24 hours operation, assuming the system is in the activated but unalarmed state for 22 hours and in an alarm-activated mode for 2 hours.

27.3 CONTROL UNIT

- 27.3.1 The control unit shall be capable of identifying at least 100 inputs, from detector devices. It shall be possible to allocated the devices to at least eight (8) different zones.
- 27.3.2 The alarm unit shall cater for:
- a) Detectors
 - b) A control key pad
 - c) Alarm output
- 27.3.3 The box of the alarm unit, which shall incorporate a “tamper” alarm, shall be suitable for wall-mounting, and shall accommodate the power supply and battery as specified.

27.4 CONTROL KEYPAD

- 27.4.1 The control keypad shall permit:
- a) Allocation of detectors to zones;
 - b) Documentation of any detector from the system;
 - c) Activation and deactivation of entire alarm system;
 - d) Activation and deactivation of any one zone;
 - e) Allocation, and cancelling of PIN codes;
 - f) Maintenance diagnosis of system;
 - g) Alarm cancel;
- 27.4.1.1 Access to facilities (a) to (g) shall be by means of PIN codes. There shall be:
- a) A master PIN code to allow access to any feature of the system;
 - b) A maintenance PIN code to allow access to (a) to (d) and (f), (g) in 12.4.1 plus any maintenance related features;
 - c) A user PIN code to allow access to (c), (d) and (g) in 12.4.1 above.
- 27.4.2 The keypad shall incorporate a tamper alarm.

27.5 PASSIVE INFRARED DETECTORS

- 27.5.1 The PIR detectors shall be ceiling-mounted units with dual-element pyroelectric infrared sensing element.

POLOKWANE SOFTBALL STADIUM

- 27.5.2 The detector shall have a 360° field of view in the horizontal plan, and shall have a horizontal range of at least 9 metres with the mounting height between 2,4 and 4,5 metres.
- 27.5.3 All electronics associated with the detector shall be accommodated in one case, this is suitable for ceiling mounting.
- 27.5.4 The unit shall incorporate a light emitting diode (LED) to indicate the “detector active” state.
- 27.5.5 The detector shall incorporate a tamper alarm.
- 27.5.6 The detector shall operate off a power supply with 8v to 18v (DC) output.

27.6 MAGNETIC REED SWITCH TYPE DETECTORS

- 27.6.1 The doors to the Main Entrance (Security Desk) shall be fitted with recessed magnetic reed switches type detectors.
- 27.6.2 The magnets shall be recessed into the door, and the reed switch into the frame.

27.7 SIRENS

- 27.7.1 The sirens shall provide a distinctive sound, and be audible over a range of 250 metres.
- 27.7.2 The units shall be weatherproof, suitable for installing outside.
- 27.7.3 A remote buzzer and red light shall be provided at the security desk at the main entrance.

27.8. WIRING

- 27.8.1 The wiring shall be in conduit specified under the electrical section of this document.

27.9 DOCUMENTATION

- 27.9.1 3 Sets of documentation shall be provided, which shall incorporate:
- a) A description of the system.
 - b) “As Built” drawings.
 - c) A detailed list of system constituents (e.g. value and type of PIR detector);
 - d) Specification of system constituents;
 - e) Setting up, programming and commissioning procedure.
 - f) Preventative maintenance procedure and recommended testing intervals.
 - g) Operating instructions.

POLOKWANE SOFTBALL STADIUM

27.10. SYSTEM COMMISSIONING

27.10.1 The system shall be fully commissioned prior to first delivery.

27.11 TRAINING

- The contractor shall train 3 persons in the programming and use of the system.

29. LIGHTNING PROTECTION

GENERAL SPECIFICATION

29.1 SATISFACTORY INSTALLATION

The whole of the installation shall be carried out in accordance with:

- (a) The latest S.A.B.S. Code of Practice for the Protection of Structures against Lightning – S.A.B.S. 03; S.A.B.S. IEC 61024 (1), 61024 (1 –1) S.A.B.S. IEC 61312 (1); S.A.B.S. IEC 61662 & NRS 042.
- (b) The KwaZulu-Natal Department of Works General Electrical Specification.
- (c) The Municipal By-Laws and any other special requirements as deemed necessary by the Local Supply Authority.
- (d) Local Fire Regulations.

29.2 S. A.B.S. APPROVED DRAWINGS

S.A.B.S. Approved drawings are not required for this project.

29.3 TEST ON COMPLETION

Upon completion of the lightning protection system, the following tests shall be witnessed by an appointed representative of the Employer. The results shall be recorded on suitable test certificates, which must be signed, by both the Contractor and the Employers representative. A sketch must be included on each test certificate indicating the position of each electrode in relation to some permanent reference point. It must also indicate the positions at which tests were carried out, the type of test and results of these tests.

29.3.1 Earth Resistance Test

The Earth Resistance Test shall involve measuring the resistance to earth of each rod-type electrode, or group of rod-type electrodes, or trench earth which would normally be connected to one down-conductor or earth terminal. This test must be made with the electrodes completely disconnected from any part of the structure or lightning protection system.

29.3.2 Electrical Continuity Tests

POLOKWANE SOFTBALL STADIUM

(a) External Down-Conductors

Electrical continuity between the lower ends of external down-conductors which must all be disconnected from the earthing system during the test shall not exceed 1 (one) ohm.

(b) Metallic Services

Electrical continuity between any metallic structures of services (e.g. rainwater pipes) which forms an integral part of the lightning protection system shall not exceed 1 (one) ohm. These tests should be carried out with all other components of the lightning protection system disconnected from the component being tested.

29.4 DESCRIPTION OF MATERIAL

29.4.1 Air Terminals and Down-conductors

All conductors must be in accordance with the requirements and BBS 1474 or American Standards Specification 6063. All aluminium conductors shall have a cross section area of not less than 30mm² (domestic dwelling only) or 50mm² for all other applications. The dimensions of flat section conductors to be 20mm x 3mm. Where conductors are mounted in stand-off guides, the cross-section area of the conductor must be not less than 70mm² to give adequate mechanical strength.

29.4.2 Conductor Guides

The conductor must be mounted in aluminum alloy guides conforming with the material specification given in 4.1 above. The guides must allow for free longitudinal movement of the conductor to cater for expansion and contraction of the system caused by temperature variation. The minimum thickness of any part of the guide shall not be less than 3mm. The guides must be securely attached to the structure using two stainless steel screws and plugs, the use of plated screws is not permitted.

The conductor system shall be supported in guides so that an air gap exists at all times between the aluminium and the surface of the structure, the guides being seated upon plastic or other similar insulating material. Should conductors be installed directly upon the surface of concrete or cement plaster, an insulating strip is to be installed over its whole length to prevent contact between the two surfaces. Guides shall be installed to support the conductor at intervals not exceeding 1,2 metres horizontally or 1,5 metres vertically.

N.B.: No part of an aluminium conductor system must be allowed to come into direct contact with concrete or cement plaster as this may cause the aluminium to corrode.

29.4.3 Expansion Loops

Where conductors are installed horizontally without deviation from a straight line over long distances, expansion loops must be provided at distances not exceeding

POLOKWANE SOFTBALL STADIUM

30metres. These expansion loops must have a cross-sectional area, which is at least equal to that of the conductor.

29.4.4 Protection of Down-conductors

Where external down-conductors are installed in areas, which is readily accessible to the public, the lower ends of the conductors shall be enclosed in a semi-rigid insulating material. In the case of a circular section conductor this shall comprise a 2metre length of 20mm diameter PVC conduit. This conduit shall be securely attached to the wall by means of galvanized steel saddles fixed with stainless steel screws and plugs, spaced at intervals not exceeding 1metre. Where a flat section conductor is used this shall be covered by a similar length of 25mm PVC conduit. The lower end of the conduit shall be positioned as close as practicable to ground level. I.e. immediately above an aluminium to copper joint. The ends of the conduit shall not be sealed.

29.4.5 Earthing Electrodes

Earthing electrodes must consist of either copper-clad steel rods not less than 12mm in diameter and having a minimum copper thickness of 0,20mm driven into the ground, or a 50mm² (35mm² for domestic dwellings) bare copper conductor buried in a trench, or combination thereof. Where copper clad steel electrodes are used they must have a suitable bond between the steel core and copper exterior to prevent moisture ingress between the two metals.

Where it is necessary to extend earth rods, an electrolytically compatible corrosion resistant, coupling device, which prevents ingress or moisture into the joint shall be used. The copper conductor below the down-conductor joint shall be covered by a semi-rigid PVC conduit for a distance of approximately 200mm above ground and 400mm below ground.

29.4.6 Joints above ground

Circular section aluminium conductor shall be joined by aluminium ferrules or lugs, which are securely crimped into place. Aluminium lugs must be bolted together using 10mm diameter aluminium bolts and washers. The material specification for these components must conform with that laid down in paragraph 4.1. Alternatively heavily tinned copper lugs and ferrules may be used. The lugs should be joined together by means of 10mm diameter copper, brass or bronze bolts and washers. Care should be taken to inhibit corrosion where dissimilar metals are used by thoroughly cleaning the surfaces of the metal before assembly and subsequently sealing the joint with an inert tenacious compound or tape.

Flat section aluminium conductors shall be joined by double riveting, using aluminium rivets which comply with the material specification laid down in 4.1. Alternatively 2 x 6 mm diameter stainless steel bolts, nuts and washers may be used. Fold over type bends will not be permitted.

Down-conductors are to be terminated approximately 200mm above finished ground level. Circular section aluminium is to be jointed to a 50mm² (35mm² in the case of domestic dwellings) stranded copper conductor by securely crimping in place two heavily tinned lugs and bolting these together using 10mm diameter copper, brass or bronze nuts, bolts and washers.

POLOKWANE SOFTBALL STADIUM

N.B.: Under no circumstances shall aluminium conductors be buried in the ground.

29.4.7 Joints below ground

A joint in the stranded copper conductor which forms part of the earthing system must be made by using a crimped copper ferrule clamping (not lugs) using two copper line taps of suitable dimensions, or exothermic welding. The copper earth conductor must be joined to an earth rod by either clamping, using a standard earth rod clamp or copper line tap or by exothermic welding. Joints, which are made between dissimilar metals (i.e. copper conductor to galvanized steel water main), must be thoroughly cleaned before assembly. They shall be rendered watertight using waterproof adhesive tape on a suitably compound for a minimum distance of 200mm in all directions from the joint.

29.4.8 Bonds

Where it is necessary to bond the aluminium conductor to any other metallic surface, this must be done by bolting or riveting. When attaching aluminium to a dissimilar metal the joints are to be thoroughly cleaned and sealed to prevent corrosion.

29.5 GENERAL INSTALLATION PROCEDURE

29.5.1 Air Terminals for Non-metallic Pitched roofs

Aluminium conductors are to be installed along all ridges of roofs and projections such as dormer windows etc., terminating at the ends with conductors running downwards over the surface of the roof and the eaves. Non-metallic chimneys must be protected by means of a finial of sufficient length to cover the chimney within a 45° angle struck downwards from its point. Alternatively it should have a conductor installed in the form of a closed loop upon the upper surface. The conductors are to follow the outer contour of the stack and must be bonded at a convenient point to the nearest component of the air terminal system.

N.B.: This bond may run in a horizontal or a downward direction, but under no circumstances must any part of it run above horizontal.

Conductors may be dead-ended (i.e. have one end free and unbounded), providing that the length of such a conductor does not exceed 10 metres and that the unbounded end is either at the same level or higher than the bonded end. This technique may be used where ridge conductors are installed over dormer windows, etc.

In all cases where metallic gutters have been installed along the eaves of a pitched roof, these must be bonded to the air terminal system. Where metallic gutters do not exist, however, a conductor must be installed over the surface of the roof at eaves level to which the remainder of the air terminal system is to be bonded, with the following exceptions:

POLOKWANE SOFTBALL STADIUM

- (a) Where the maximum distance from the ground level to the eaves of the building is less than 4 metres and the pitch of the roof is more than 1 in 2 (27° from the horizontal).
- (b) Where the maximum distances from ground level to the eaves is less than 7 metres and the pitch of the roof is more than 1 in 1,5 (34° from the horizontal.)
- (c) Where the distance from the ground level to the eaves is more than 7 metres and the pitch of the roof is more than 1 in 1 (i.e. the included angle at the apex of the roof is less than 90°)

Under these circumstances eaves conductors need to be installed.

Any non-metallic objects which protrude above the general roof lines, such as Cape Dutch gable ends, must be protected as described above with a suitable air terminal system. Any metallic objects which protrude above the general roof line, such as hot water expansion pipes must be bonded as directly as possible to the nearest eaves conductor, gutter or part of the lightning system.

N.B.: These bonding conductors must run in an horizontal or preferably a downward direction, from the vent pipe etc., to the lightning protection system.

29.5.2 Air Terminals for Metallic Pitched Roofs

Buildings with roofs covered with electrically continuous metal sheets do not require separate air terminals but must be earthed via down conductors generally as described in 5.6 5.7. Any non-metallic objects projecting above the general roofline must be separately protected as described in 5.1 and bonded to the metal roof covering.

29.5.3 Air Terminals for non-metallic flat or Mono-pitched roofs

For flat or mono-pitched roofs of non-metallic construction the air terminal system must consist of aluminium alloy conductors installed around the outer perimeter of each section of the roof structure. These conductors must be installed on top of parapet walls if these exist. Lift motor rooms, tank rooms, penthouses, etc. which protrude above the general roof line must have air terminal conductors installed around the outer perimeter of each roof slab or parapet wall. Any metallic objects which protrude above the roof line, such as expansion pipes, signs, flag poles, hydrails, etc. must be bonded directly to the nearest component of the lightning protection system as described in 5.1.

N.B. : It is not permissible for the ends of conductors to be bonded directly to the perimeter air terminal system if the latter is installed upon a parapet wall having a height exceeding 500mm above roof slab level. In these circumstances the conductors are to be bonded directly to the down conductors.

29.5.4 Air Terminals for Metallic flat or Mono-Pitched roofs

Metallic flat or mono-pitched roofs do not require separate air terminal conductors, providing that there is electrical continuity between the metallic roofing sheets, (see 5.2) A metallic roof surrounded by a non-metallic parapet wall shall have conductors installed at the top of the parapet wall and these must be bonded to the metallic roof at intervals not exceeding 20 metres. If the parapet wall is clad with metal over its

POLOKWANE SOFTBALL STADIUM

upper surface or a handrail is installed which affords good electrical continuity, separate air terminal conductors need to be installed. Under these circumstances the metal handrail or cladding must be bonded to the metal roof covering at intervals not exceeding 20 metres.

All non-metallic covering such as slates, tiles, asbestos cement sheeting, etc. supported by a steel structure being electrically continuous throughout may be treated as being of a complete metal construction. In these circumstances no separate air terminal system need be installed providing the steel roof structure is bonded to earth at intervals given in 5.5.

29.5.5 Down Conductors for Non-metallic Structures

Down conductors must be installed at regular intervals around structures and to run as directly as possible between the air terminal and earthing system. They must, where practicable, be positioned at the external corners of the structure. The maximum separating distance between down conductors around the perimeter of the structure must not exceed 30 metres. In the case of very tall buildings having a slender base (i.e. chimney stacks, water towers, etc.), a minimum of two down conductors must be installed.

The lower ends of down conductors are to be terminated and bonded to the earthing system approximately 200mm above finished ground level. Under no circumstances must aluminium conductors be buried underground. Test joints must be provided between the down conductors and earthing system. Down conductors must run vertically between the air terminal and earthing systems. Where this is impracticable, their course may be deviated to run any angle up to and including horizontal.

Where it is necessary to run conductors horizontally over the upper surface of a structural protrusion, such as an exposed concrete slab, the conductor may run down vertically over the edge of the slab and return to the main structure, so that the distance between the upper and lower conductors exceeds one third of the length of the horizontal run. Looped down conductors are not permitted. Down conductors must not run over the underside of large overhangs which are less than 6 metres above ground level, or other areas where people are likely to be present during a thunderstorm.

External or internal metallic rainwater pipes may be used as down conductors providing these are of substantial section and are joined by screwing one length into another or welding. Thin gauge galvanised steel pipes whose sections are held together by friction, rivets or screws must not form part of a lightning protection system.

29.5.6 Down conductors for reinforced concrete framed structures

The steel reinforcement of this type of structure may be used in place of down conductors. Where the reinforcing system is used, the air terminal system must be bonded to it at a maximum of 30 metre intervals using steel clamps. This bond may be achieved by clamping, with a steel clamp, a steel conductor to a selected reinforcing bar, the opposite end of this conductor must terminate at a corrosion resistant metallic terminal such as Grade 316 stainless steel.

The reinforcing system of prefabricated concrete buildings must not be used unless special provision is made for bonding the various prefabricated sections together.

The terminals should be mounted flush with the face of the concrete. An aluminium alloy bond must then be taken from the air terminal system and be connected to the stainless steel terminal by means of a heavily tinned crimp lug for circular section aluminium, or suitable bi-metallic joint in the case of flat section aluminium. A similar system must be used to bond the reinforcing system at ground level to the earthing system at points directly below the terminal bonds. Here copper conductors must be used as the external bonding material.

Under no circumstances must copper, or other non-ferrous material be allowed to come into contact with steel reinforcing bars, as this may cause severe corrosion and subsequent structural damage. The lightning protection system must not be bonded to any part of the structure, which is electrically isolated from the remainder of the building, i.e. cantilevered sections. In these circumstances, or where it is otherwise impracticable to use the reinforcing system, external down conductors must be installed as described in 5.5.

29.5.7 Down conductor for steel framed structures

Where the framework of a building is constructed of structural steel columns, these may be used in place of down conductors providing the separating distance between them does not exceed 30metres. The upper ends of the columns must be bonded to the air terminal systems and the lower ends to the earthing system.

29.5.8 Earthing by means of vertically installed rod type electrodes

Rod-type electrodes must be driven into the ground at a position directly below each down connector. The maximum earthing resistance of each electrode or number of electrodes bonded to any one down conductor shall not exceed $N \times 30\text{ohms}$, where N equals the total number of down conductors which are bonded to a common air terminal system, or 200ohms whichever is the lower value.

The minimum horizontal separating distance between rod-type electrodes bonded together must not be less than their installed depth. The upper ends of installed rod-type electrodes are to be terminated approximately 500mm below finished surface level. A 50mm² copper-bonding conductor must be installed to run between each earthing electrode system and the lower ends of the adjacent down conductors. A joint is to be made between each of these bonding conductors and the down conductors at a position approximately 200mm above finished ground level. These bonding conductors must be installed in P.V.C. conduit securely affixed to the wall (see 3.4). The length of this P.V.C. conduit must be approximately 600mm and must be installed so that approximately 200mm protrudes above ground level, the remainder being buried into the soil.

29.5.9 Earthing by means of metallic water mains

Where two or three down conductors are installed the water mains may serve as an earth terminal for one of these. Where three or more down conductors are installed the water mains may serve as an earth terminal for two of these. Regardless of whether the water mains are used as an earth terminal or not, the incoming metal water pipe must be bonded to the lightning protection earthing system underground.

29.5.10 Earthing by means of trench type electrodes

POLOKWANE SOFTBALL STADIUM

Where the soil conditions prevent the satisfactory installation of rod-type electrodes, a trench earth system must be installed. This method is to comprise a 50mm² stranded copper conductor installed horizontally into a trench at a depth of 500mm below finished ground level. The conductor is to follow the general outline of the structure to be protected and be installed 1metre away from the outside walls. Where the building stands on rocky ground, the trench earth may be attached to the lower part of the wall in areas where rock protrudes through the soil. The conductor must, however, be buried wherever possible as described above.

Each down conductor must be bonded to the trench earth system as directly as possible by means of a copper conductor.

Trench earth systems must have a maximum earth resistance of 30ohms. An isolated length of trench earth mat must be bonded to the down conductor system in such a way as to reduce the length of dead-ends to the minimum.

Should trench earths be installed beneath pathways where people are likely to be present during a thunderstorm, a plastic, bitumastic or ceramic pipe must be installed having a length similar to the width of the pathway and the trench earth conductor run inside it.

N.B.: The maximum useful of a dead-ended trench is 80metres.

36. GENERAL

Issue Compliance Certificates for all existing buildings on Site, see Site Plan.

37. CONCRETE CABLE MARKERS

The Contractor shall supply and install concrete cable markers to indicate positions of all cable joints and wherever a turn occurs in the run of the cable. The cable markers will be buried into the ground directly above and in line with the cable route and with the bottom of the aluminium nameplate, level with the finished ground level. Maximum separation distance between adjoining cable markers will not exceed 50m. The Contractor will further allow for the inscription to be provided by the Client's.: Representative, to be punched onto the aluminium nameplate.

Details for the manufacture of the cable markers are indicated and specified on the accompanying typical drawings.

38. CABLE MARKING TYPE

Cable marking tape must be installed above all underground cables. The cable marking tape must be of the yellow PVC marking type, 150mm wide and must be laid minimum 250mm above the entire length of the cable.

39. LABELLING

39.1 Labelling–Distribution Boards, Kiosks, Switches and Switched Socket Outlets

All circuits and apparatus on distribution boards, kiosks etc. shall be suitable and correctly labelled by means of engraved plastic labels (black lettering on white),

POLOKWANE SOFTBALL STADIUM

lettering shall be minimum 3mm in height, which are to be bolted or screwed to the equipment panel, or fitted in the channelling provided below the switchgear.

Sub Circuits are to be numbered and a legend card detailing the circuits is to be framed and fitted to the door of the distribution board/ kiosk. A laminated as built schematic drawing indicating the layout of the kiosk/ distribution board schematics must be installed on the inside of the distribution board/ kiosk.

All distribution boards/ kiosks are also to be labelled with a PVC engraved label on which the name of the kiosk/ distribution boards is clearly indicated and fixed with self-tapping screws to the outside of the boards in a central position. The lettering shall be 8mm in height and shall be generally black on white or otherwise indicating depending on the function of the kiosk or distribution board (white on red for Essential Supply or white on blue for UPS supply).

All distribution boards and kiosks and other electrical panels are also to be fitted on the inside on the face plate with a PVC engraved label on which the name, designation of the board, size of feeder cable, fault level rating, and phase station is clearly indicated and fixed below the main switch. The lettering shall be 3mm in height and shall be generally black on white or otherwise stated depending on the function of the distribution board/ kiosk. (White on Red for Essential Supply or White on Blue for UPS Supply). i.e.

DB Name	:	DBA
Fed From	:	Kiosk A
Size of Cable	:	25mm x 4C
Fault Level	:	25/kA
Phase Rotation	:	Clock wise

All switched socket outlets, isolators and light switches shall be labelled as follows with minimum letter size of 3mm in height:

Example:

A plug circuit on DBA having 4 x switched socket outlets shall be labelled, DBA/ P1/ 1, DBA/ P1/ 2, DBA/ P1/ 3 and DBA/ P1/ 4 by means of engraved letters on the switched socket outlet cover. All plugs on power skirting and bed head ducting where socket outlet covers are not installed shall be labelled with PVC labels on the same basis as mentioned above. All PVC labels must then be screwed or pop riveted to the ducting.

A light circuit on DBA having 12 lights and two light switches in different rooms or on bed head ducting shall be labelled DBA/ L1/ 1 and DBA/ L1/ 2 by means of engraved letters on the light switch cover. All light switches on bed head ducting where switch covers are not installed shall be labelled with PVC labels on the same basis as mentioned above. All PVC labels must then be screwed or pop riveted to the ducting.

All Main Switches on distribution boards and kiosks must be labelled as "Main Switch". The correct danger notice as indicated in SANS 10142-1 in connection with Main Switches must also be installed giving notice that the switch disconnect or be switch off in the event of inadvertent contact or leakage.

39.2 Labelling – Cables

POLOKWANE SOFTBALL STADIUM

Circuits which are removed from distribution boards must be marked "SPARE" on the distribution boards. All cables entering and leaving distribution boards and kiosks must be labelled with PVC labels indicating the size of the cable. The label shall be fitted to the cable using cableties and shall be located directly below or above.

All outlets especially the terminal boxes associated with the intercom or telephone installation must be labelled as such. Labels indicating the supply point and size of the supply cable must be provided on each distribution board. Every cable or circuit will be marked with as approved Bowthorpe Hellerman tag showing the size and details of every cable entering or leaving the board. All identifications shall correspond with "as built" drawings and single-line diagrams associated with the contract.

Where switchboards are positioned behind doors of building structure i.e. build-in cupboards, a suitable approved electrical danger sign as well as the applicable distribution boards designate label must be supplied and fitted in a suitable position on the outside top section of one of the entrance doors at each such location.

40 MAINTENANCE MANUALS

The contractor shall compile 4 off Maintenance Manuals of all equipment installed under this project. All Maintenance files shall be handed over to the Electrical Engineer prior to 1st Delivery Inspection together with Test Certificates, as Built Drawings and Compliance Certificates (COC's)

- Specified values! requirements.
- Measured! observed values! requirements.
- Remarks.
- Name and capacity of person that performed the test.
- Date of tests.
- Space for acceptance of the test report by the Clients:
- Representative and the Employer.

(d) The acceptance test procedures must be submitted to the Clients:

Representative for approval at least four weeks before the scheduled completion date.

POLOKWANE SOFTBALL STADIUM

1.1 POLOKWANE SOFTBALL STADIUM SWITCHGEAR SPECIFICATIONS

SOFTBALL SUBSTATION	TECHNICAL SCHEDULE	
	A	B
<u>Electrical Dimensions</u> Rated Voltage Rated Operating Voltage Rated Power Frequency Withstand Voltage Rated Lightning Impulse Withstand Voltage Rated Short-Time Withstand Current Rated Short-Circuit Duration Rated Peak Current Rated Current Busbar Rated Current Busbar	17.5 kV 11 kV 38 kV 95 kV 21 kA 3 s 52.5 kA 630 A 630 A	
<u>Degree of Protection</u> Degree of Protection	IP 3X	
<u>Installation</u> Minimum Ceiling Height Minimum Clearance to Building Rear Wall Minimum Clearance Front Minimum Clearance to Side Left Minimum Clearance to Side Right	2500 mm 500 mm 800 mm 100 mm 500 mm	
<u>Dimensions</u> End Panel Width Left End Panel Width Right <u>Staff Protection in the Event of Internal Fault</u> Arc Test Current Arc Test Current Duration <u>Properties</u> Internal Arc Withstand Busbar Material Gas Exhaust Duct Mechanical Impact Resistance Low Cable Assembly Height Raising Plinth LV wiring inter-cubicles Voltage for Auxiliary Power Supply Communication Option Remote Terminal Unit R200 Modern Type Reverser / changeover switch of source ATS100 Source Changeover I/O Type Substation Earth Connection Cable Earthing Collector Type of Label Language of Labels <u>LV Wiring</u> Wiring Option Marking Type Marking Mode Marking Mode Info	35 mm 35 mm 21.0 kA 1.00 s AFLR Aluminum Bottom IK 07 700mm Without 24 V DC Without Without Without Without Left and Right Hand Included Laser English Standard Dependent Both End Marking directly on wire Insulation Using Indelible black ink Projection process H05V2-K/H07V2-K 1015	

POLOKWANE SOFTBALL STADIUM

Type of Wiring'	HAR	
Wiring Characteristics	Flame retardant according to IEC60332-1	
Control Circuit	1.0 mm2	
Control Circuit Color	White	
Current Circuit	2.5mm2	
Control Circuit Color	White	
Current Circuit	1.5mm2	
Voltage Circuit	White	
Voltage Circuit color	1.00mm2	
Inter-Cubicle Links	White	
Inter-Cubicle links Color	1.5mm2	
Supplies Inter-Cubicle Links	White	
Supplies Inter-Cubicle Links Color	2.5mm2	
Earth Circuit	Yellow / Green	
Earth Circuit Color		

D06H – Incomer 1/D06H – Incomer 2

Quantity- 2

<u>Type of Construction</u>		
Type of Cubicle	Line Feeder or Incomer	
Switching Device	Circuit Breaker	
Current Transformer Outgoing		
Voltage Transformer Outgoing		
Earthing Switch Outgoing		
Primary Connections	Cable	
<u>Electrical Dimensions</u>		
Rated Operating Current Outgoing	630 A	
<u>Dimensions</u>		
Cubicle Width	375 mm	
Cubicle Height	1995 mm	
Cubicle Depth	1135 mm	
Paint	RAL 9003	
<u>Properties</u>		
Core Unit Selection	D06H	
Operating Mechanism	Electrical	
Universal Intelligent Controller	SC-110 (with MODbus Communication 3 X RJ45)	
HMI Push Button Panel	HMI with remote/Local Switch	
Cable Test Drive	Not Included	
Voltage Indication Type	VPIS	
LV Cabinet	C	
Protection Relay Type	Local	
Earth Fault Protection	Standard	
Front Cable box Depth	500	
Cable Quality per Phase	1	
Bottom Cable Type	700	
Cable Clamp	Single Core	
CT Type Protection	With metallic cut-out for cable	

POLOKWANE SOFTBALL STADIUM

Integrated Measurement Measurement Device Power Measurement Communication CT type for Measurement Voltage Protection Voltage Measurement VT Primary Voltage (kV) VT insulation Level Interlocking Cable box front door / Main and Earthing Switch	ARU2 Yes PM5110 With ARU1 Yes Yes 11 kV 17.5/38/95 kV With	
<u>CT and VT Characteristics</u>		
1 st CT Type	ARU2	
1 st CT Core 1 Description	600/1 -2.5 VA -5p20	
2 nd CT Type	ARU1	
2 nd CT Core 1 Description	600/1 -02.5 VA – 0.5s FS <10	
1 st VT Type	VRU1	
1 st VT Core 1 Description	0.11/V3 – 10 VA – Cl. 0.2	
1 st Core 2 Description	0.11 /3 – 30 VA – Cl. 3P	

LIST IF SWITCHING DEVICES

Vacuum Circuit Breaker	
Motor Drive MCH Shunt Opening Release MX1 Shunt Tripping Release MX2 Shunt Closing Release XF Contacts for main switch Note Switching Sequence Operating Counter Push Button Cover Wiring Diagram	24 V DC 24 V DC 24 V DC 24 V DC 6 O/C (B01-B02 & B03-806) B02 used for SC 100/SC110 0-0,3 s-CO-15 s-CO With With Standard
Earthing Switch	
Earthing Switch Drive Contacts for Earth switch None Interlocking Cable box front door /Main and Earthing	Manual Drive 2O/C (B11-812) B11 used for SC 100/SC 110 With
LIST OF SECONDARY EQUIPMENT	

POLOKWANE SOFTBALL STADIUM

1 Protection relay P3U30-5AAA1BCAA In case for flush Mounting Type: Easergy Protection Relays Ordering-No: REL52003 Easergy P3U30, 4L,4U, 16DI/8DO, Uaux: 48 – 230V, DI: 24-230V, 2Xrj-45 Make: Schneider Electric Documentation Multilingual	
1. Current test box “Essailec” In Case for Flush Mounting Documentation	
2. Miniature circuit breaker C60 n 2 poles 2A – C Curve in Case for Rail Mounting Type: C60N Contact Arrangements B/M/CO: 0/0/0 Input Current 2... A Documentation English	
Miniature circuit breaker C60 N 2 poles 3a – C Curve In Case for rail Mounting Type: C60N Contact Arrangement B/M/CO: 0/0/0 Input Current 3... A Documentation English	

DO6H-FEEDER 1/DO6H-FEEDER 2/DO6H-FEEDER 3/ DO6H-FEEDER 4

Quantity- 4

<u>Type of Construction</u> Type of Cubicle Switching Device Current Transformer outgoing Earthing Switch Outgoing Primary Connection	Line feeder or Incomer Circuit Breaker Cable	
<u>Electrical Dimensions</u> Rated Operating Current Outgoing	630A	
<u>Dimensions</u> Cubicle Width Cubicle Height Cubicle Depth Paint	375m 1995m 1135m RAI 9003	
<u>Properties</u> Core Unit Selection Operating Mechanism Universal Intelligent Controller HMI Push Button Panel Cable Test Device	D06H Electrical SC-110 (With Modbus Communication 3X RJ45) HMI with Remote/Local	

POLOKWANE SOFTBALL STADIUM

Voltage Indication Type LV Cabinet Protection Relay Type Earth Fault Protection Front cable box depth Cable Quantity per Phase Cable Connection Height Bottom cable type Cable Clamp CT Type for Protection Interlocking cable box front door and earthing Switch	Switch Not Included VPIS c Local Standard 290 1 700 Single Core With metallic Cut-out for cable ARU2 With	
<u>CT and VT Characteristics</u> 1 st CT Type 1 st CT Core 1 Description	ARU2 200/1 – 2.5 VA – 5P20	

LIST OF SWITCHING DEVICES

1 Vacuum Circuit Breaker Motor Drive MCH Shunt Opening Release MX1 Shunt Tripping Release MX2 Shunt Closing Release XF Contacts for main switch Note Switching Sequence Operating Counter Push Button Cover Wiring Diagram	24 V DC 24 V DC 24 V DC 24 V DC 6 O/C (B01-B02 & B03-B06) B02 used for SC100/SC110 O-0, s-CO-15 s-CO With With Standard
1. Earthing Switch Earth Switch Drive Contacts for Earth switch Note Interlocking cable Box front/ Main and earthing Switch	Manual Drive B11 used for SC100/SC110 With
<u>Listing of Secondary Equipment</u> 1. Protection Relay P3u30-5AAA1BCAA In case for Flush Mounting Type: Easergy Protection Relays Ordering-No: REL52003 Easergy P3U30, 4L, 4U, 16DI/8DO, Uaux: 48 – 230V, DI: 24-230V, 2 x Rj-45 Make: Schneider Electric	

POLOKWANE SOFTBALL STADIUM

1	Current test box "Essailec" In Case for Flush Mounting Documentation French	
2	Miniature circuit Breaker C60 N 2 Poles 2A – C Curve In Case for Rail Mounting Type: C60N Contact Arrangement B/M/CO: 0/0/0 Input Current 2... A Documentation English	
2.	Miniature circuit breaker C60 N poles 3A – C Curve In Case for Rail Mounting Type: C60N Contact arrangement B/M/CO: 0/0/0 Input Current 3... A Documentation English	

D06H – Bus Section

Quantity 1

<u>Type of Construction</u> Type of Cubicle Switching Device Current Transformer Outgoing Earthing Switch Outgoing Primary Connection	Bus Coupler Left Circuit Breaker Coupler to the Right	
<u>Electrical Dimensions</u> Rated Operating Current Outgoing	630A	
<u>Dimensions</u> Cubicles Width Cubicle Height Cubicle Depth Paint	375 mm 1995 mm 1135 mm RAL 9003	
<u>Properties</u> Core Unit Selection Operating Mechanism Universal Intelligent Controller HMI Push Button Panel Cable Test Drive Voltage Indication Type LV Cabinet Protection Relay Type Earth Fault Protection Front cable box depth CT Type for Protection Interlocking Cable box front door / Main and Earthing Switch	D06H Electrical SC-110 (With Modbus Communication 3x RJ45) HMI with remote/Local switch Not Included VPIS C Local Standard 290 ARU2 With	
<u>CT and VT Characteristics</u> 1 st CT Type 1 st CT Core 1 Description	ARU2 600/1 – 2.5 VA – 5P20	

POLOKWANE SOFTBALL STADIUM

LIST OF SWITCHING DEVICES

Vacuum Circuit Breaker Motor Drive MCH Shunt Opening Release MX1 Shunt Tripping Release MX2 Shunt Closing release XF Contacts for main switch Note Switching Sequence Operating Counter Push Button Cover Wiring Diagram	24 V DC 24 V DC 24 V DC 24 V DC 6 O/C (B01-B02 & B03-B06) B02 used for SC100/SC110 O-0, 3 s-CO- 15 s-CO With With Standard
Earthing Switch Earthing Switch Drive Contacts for earth switch Note Interlocking Cable box front door / Main and Earthing Switch	Manual Drive 2 O/C (B11-B12) B11 used for DC100/SC110 With
<u>Listing of Secondary Equipment</u>	
1 Current test box "Essallec" In Case for Flush Mounting Documentation French	
2 Miniature circuit Breaker C60 N 2 Poles 2A – C Curve In Case for Rail Mounting Type: C60N Contact Arrangement B/M/CO: 0/0/0 Input Current 2... A Documentation English	
2. Miniature circuit Breaker C60 N 2 Poles 2A – C Curve In Case for Rail Mounting Type: C60N Contact Arrangement B/M/CO: 0/0/0 Input Current 2... A Documentation English	

G06 – Riser
Quantity 1

<u>Type of Construction</u> Type of Cubicle Switching Device		
--	--	--

POLOKWANE SOFTBALL STADIUM

Primary Connection		
<u>Electrical Dimensions</u>		
Rated Operating Current Outgoing		
<u>Dimensions</u>		
Cubicles Width		
Cubicle Height		
Cubicle Depth		
Paint		
<u>Properties</u>		
Core Unit Selection		
HMI Push Button Panel		
Cable Test Device		
Voltage Indication Type		
LV Cabinet		
Protection Relay Type		
Earth Fault Protection		

MUNICIPALITY SUBSTATION		
<u>Electrical Dimensions</u>		
Rated Voltage	17.5 kV	
Rated Operating Voltage	11 kV	
Rated Power Frequency	38 kV	
Withstand Voltage	95 kV	
Rated Lightning Impulse	21 kA	
Withstand Voltage	3 s	
Rated Short-Time Withstand Current	52.5 kA	
Rated Short-Circuit Duration	630 A	
Rated Peak Current	630 A	
Rated Current Busbar		
Rated Current Busbar		
<u>Degree of Protection</u>		
Degree of Protection	IP 3X	
<u>Installation</u>		
Minimum Ceiling height	2500 mm	
Minimum Clearance to Building	500 mm	
Rear Wall	800 mm	
Minimum Clearance Front	100 mm	
Minimum Clearance to side Left	500 mm	
Minimum Clearance to Side Right		
<u>Dimensions</u>		
End Panel Width Left	35 mm	
End Panel Width Right	35 mm	
<u>Staff Protection in the Event of internal Fault</u>		
Arc Test Current	21.0 kA	
Arc Test Current Duration	1.00 s	
<u>Properties</u>		
Internal Arc Withstand	AFLR	
Busbar material	Aluminum	
Cable in Cable Out in one	Without	
Gas Exhaust Duct	Bottom	

POLOKWANE SOFTBALL STADIUM

Mechanical Impact Resistance Low Cable Assembly Height Raising Plinth LV wiring inter-cubicles Voltage for Auxiliary Power Supply Communication Option Remote Terminal Unit R200 Modem Type Reverser / changeover switch of source ATS100 Source Changeover I/O Type Substation Earth Connection Operating Counter Cable Earthing Collector Cable Entry point Type of Label Language of Labels	IK 07 700 mm Without 24 V DC Without Without Without Without Left and Right Hand Included Bottom front Laser English	
<u>LV Wiring</u> Wiring Option Marking Type Marking Mode Marking Mode Info Type of Wiring Wiring Characteristics Control Circuit Control Circuit Color Current Circuit Current circuit color Voltage Circuit Inter-Cubicle Links Inter-cubicle Links color Supplies Inter-Cubicle Links Supplies Inter-Cubicle Links color Earth Circuit Color	Standard Dependent Both End Marking Directly on wire Insulation Using indelible black ink Projection process HO5V2-K / HO7V2-K 1015 HAR Flame retardant according to IEC 60332-1 1.0 mm ² White 2.5 mm ² White 1.5 mm ² white 2.5mm ² Yellow/Green	

I06H --- ISOLATOR 1/I06H – Isolator

<u>Type of Construction</u> Type of Cubicle Switching Device Earthing Switch Outgoing Primary Connection	Line Feeder or Incomer Load Disconnecter	
<u>Electrical Dimensions</u> Rated Operating Current outgoing	630 A	
<u>Dimensions</u> Cubicles Width Cubicle Height Cubicle Depth	375 mm 1995 mm 1135 33 RAL 9003	

POLOKWANE SOFTBALL STADIUM

Paint		
<u>Properties</u> Core Unit Selection HMI Push Button Panel Cable Test Device Voltage Indication Type LV Cabinet Protection Relay Type Earth Fault Protection	I06H Electrical SC-110 (With Modbus Communication 3 X RJ45) HMI with Remote/Local Switch Not included VPIS C 290 1 700 Single Core With metallic cut-out for cable with	

LIST OF SWITCHING DEVICES

Vacuum Load Break Switch Motor Drive MCH Shunt Opening Release MX1 Shunt Tripping Release MX2 Shunt Crossing Release XF Contacts for main switch Note Switching Sequence Operating Counter Wiring Diagram	24 V DC 24 V DC 24 V DC 24 V DC 6 o/c (B01-B02 & B03-B06) B02 used for SC100/SC110 O-0,3 s-CO-15 s-CO With Standard
Earthing Switch Earthing Switch Drive Contacts for Earth switch Note Interlocking Cable box front door / Main and Earthing Switch	Manual Drive 2 O/C (B11-B12) B11 used for SC100/SC110 With

D06H - Feeder 1/D06H – Feeder2

Quantity 2

<u>Type of Construction</u> Type of Cubicle Switching Device Current Transformer Outgoing Earthing Switch Outgoing Primary Connection	Line Feeder or Incomer Circuit Breaker Cable	
<u>Electrical Dimensions</u> Rated Operating Current Outgoing	630 A	
<u>Dimensions</u> Cubicle Width Cubicle Height Cubicle Depth paint	375 mm 1995 mm 1135 mm RAL 9003	
<u>Properties</u> Core Unit Selection Operating Mechanism Universal Intelligent Controller HMI Push Bottom Panel Cable Test Device Voltage Indication Type LV Cabinet Protection Relay Type	D06H Electrical SC-110 (With Modbus Communication 3 X RJ45) HMI with Remote/Local Switch Not Included VPIS C	

POLOKWANE SOFTBALL STADIUM

Earth Fault Protection Front cable box depth Cable Quantity per Phase Cable Connection Height Bottom cable type Cable Clamp CT Type for Protection Interlocking Cable box front door / Main and Earthing Earthing Switch	Local Standard 290 1 700 Single Core With metallic cut-out for cable ARU2 With	
<u>CT and VT Characteristics</u> 1 st CT Type 1 st CT core 1 Description	ARU2 200/1 – 2.5 VA – 5P20	

LIST OF SWITCHING DEVICES

1 Vacuum Load Break Switch Motor Drive MCH Shunt Opening Release MX1 Shunt Tripping Release MX2 Shunt Crossing Release XF Contacts for main switch Note Switching Sequence Operating Counter Wiring Diagram	24 V DC 24 V DC 24 V DC 24 V DC 6 o/c (B01-B02 & B03-B06) B02 used for SC100/SC110 O-0,3 s-CO-15 s-CO With Standard
1. Earthing Switch Earthing Switch Drive Contacts for Earth switch Note Interlocking Cable box front door / Main and Earthing Switch	Manual Drive 2 O/C (B11-B12) B11 used for SC100/SC110 With

LIST OF SECONDARY EQUIPMENT

1. Protection relay P3U30-5AAA1BCAA In case for Flush Mounting Type: Easergy Protection Relays Ordering-No: REL52003 Easergy P303U, 4L, 4U, 16DI/8DO, Uaux: 48 – 230V, DI: 24-230V, 2x RJ-45 Make: Scheider Electric Documentation Multilingual	
1. Current test box "Essailec" In case for flush Mounting Documentation English	
2 Miniature circuit breaker C60 N 2poles 2A – C Curve In case for Rail Mounting Type: C60N Contact Arrangement B/M/CO: 0/0/0 Input Current 2... A Documentation English	
2. Miniature circuit breaker C60 n 2 Poles 3A – C Curve In Case for Rail Mounting Type: C60N	

POLOKWANE SOFTBALL STADIUM

Contact Arrangement B/M/CO: 0/0/0 Input Current 3... A Documentation English	
--	--

MINIATURE SUBSTATIONS (500kVA)

1. **SCOPE**

This section comprises the supply and delivery of type B miniature substations (mini-subs) as subsequently specified in accordance with NRS 004.

2. **SPECIFICATION**

These miniature substations will be of modular design consisting of three compartments, i.e.:

- (a) High tension compartment
- (b) Transformer
- (c) Low tension compartment

3. **FINISHING**

The miniature substations shall be manufactured from plate metal. All sides shall be welded so as to prevent entry by rodents.

The finishing shall be as follows:

- (a) Subsequent to manufacture, the entire box, the base, roof, as well as the radiator, shall undergo a hot dipped galvanising process according to BSS 729 of 1961.
- (b) Subsequent to galvanising, an approved etch primer shall be applied and thereafter a layer of red oxide/zinc chromate priming coat before submerging it in one layer alkaline based synthetic enamel outdoor paint.
- (c) 3CR12 steel will also be acceptable, on condition that it is handled and treated correctly.
- (d) The final finish shall be of high quality enamel paint to resemble the Colour "LIGHT PASTEL GREY" according to SANS 1091-1975 Code G69.
- (e) All doors will be equipped with a New Risi locking mechanism and the necessary danger signs. Doors will also have a device to support door when opened.

POLOKWANE SOFTBALL STADIUM

- (f) A pre-drilled cable gland mounting plate with the following holes must be provided: 6 x 75mm, 6 x 63mm, 6 x 50mm, 6 x 32mm and 6 x 25mm or rail for K-clamps or lead-in tubes.

4. **HIGH TENSION COMPARTMENT**

The switchgear shall consist of an SF6 or Vacuum ring main unit with a circuit breaker to protect the transformer, as per NRS 006.

The ring main unit must be internal arc classified AFLR according to IEC 62271-200 Annexure A for the specified fault current for 1 second. Arc ventilation must be to the top.

The ring main unit must be a non-extensible ring main unit with 2 x ring cable isolators and 1 x transformer feeder circuit breaker.

The ring isolators must be rated at 630A and the transformer feeder circuit breaker must be rated at 200A.

The transformer feeder circuit must be equipped with a self-powered overcurrent and earth fault relay and associated current transformers.

The fault capacity of the ring main unit must be 350MVA at 11kV.

Cable terminations must be of the box-type for dry type terminations in air. Cables shall be 95mm² 3 core copper conductor, paper insulated with an 11/11kV voltage gradient. The connection bushings must be Type C bushings, M16 disconnectable.

Cable terminations will be of the screened type.

The connections between the transformer and the fused-switch must be at least 35mm² copper cables.

5. **TRANSFORMER**

The following details are applicable to the transformer located in the transformer compartment, according to SANS 780 and NRS 005:

(a)	Specification	:	SANS 780/1966 NRS 005
(b)	Type	:	Free Air-Cooling Transformer
(c)	kVA size	:	500 kVA
(d)	Normal primary voltage	:	11 000 Volt
(e)	No load secondary voltage	:	420/242 Volt
(f)	Number of phases and	:	3 - 50 Hz frequency
(g)	Vector group	:	Dyn 11
(h)	H.V. tapping points	:	0% ± 2½ ± 5%
(i)	Ratio setting selector switch	:	From outside controlled no load
(j)	L.V. Neutral	:	For solid earthing
(k)	Utilisation	:	Low loss type
(l)	Oil indicator	:	Is required

POLOKWANE SOFTBALL STADIUM

(m) Cooling : ONAN

6. LOW TENSION COMPARTMENT

The low tension compartment of the miniature substations unit shall consist of the following apparatus:

<u>ITEM</u>	<u>DESCRIPTION</u>
6.1 Main circuit breaker	: 3 Pole 800 Amp moulded case circuit breaker with thermal overloading and magnetic instant fault protection. The fault current capacity shall be 25 kA.
6.2 Street lighting	: 1 x 80 Amp, 25 kA, single pole moulder case circuit breaker with thermal over current and instant magnetic fault protection. One single phase, electronic kWh energy meter suitable for 242 Volt and 0 - 80 Amp. One control contactor with coil, suitable for 242 Volt continuous operations and with 3 contacts suitable for the switching of 60 Amp per phase. One HRC fuse holder, complete with base and 80 Amp HRC fuses. (80 ka) for 242 Volt. One photocell with a single pole by-pass switch.
6.3 Feeder circuit breakers	: 3 x 60 Amp, 5 kA, single pole circuit breaker with thermal over current and instant magnetic fault protection.
6.4 Low tension distribution	: Extra positions for nine none adjustable moulded case distribution circuit breakers (mixed load) feeder circuit breakers. Minimum 25kA.
6.5 Measuring	: 1 x A1700 ELSTER meter with 3 x 800/5 current transformers on load side of main circuit breaker for total consumption purposes meters to be protected by a 1 x 5 Amp 5 ka C2 T/P circuit breaker (4 mm ² wiring)
6.6 Light	1 x 15W energy efficient lamp (bulk head) with switch protected by a 1 Amp fuse (2,5 mm ² wiring)
6.7 Earth fault indicator	1 x earth fault indicator with supply point protected by a 2 Amp fuse (1,5 mm ² wiring) Earth fault indicator unit to be installed in the HV compartment
6.8 Plug	1 x 3 point (15 Amp) plug point, protected by a 20 Amp fuse (2.5 mm ² wiring) and a double pole C/B / E/L unit.

7. IDENTIFICATION

POLOKWANE SOFTBALL STADIUM

Labels with black engraved "Trafalite" with white letters shall be provided and mounted with a suitable slide-in frame. The following labels are required:

ITEM	APPARATUS	HEADING	LETTER TYPE
(i)	800 Amp Circuit breaker	MAIN CIRCUIT BREAKER	12mm
(ii)	1 X ELSTER Meter	BULK METER	12mm
(iii)	1 x 80 Amp single pole circuit breakers	MAIN SUPPLY STREET LIGHTING	12mm
	Electronic kWh meter	STREETLIGHT METER	6mm
	2 Amp HRC fuses	CONTROL SUPPLY	6mm
	Test switch	TEST	6mm
	3 x 60 Amp single pole circuit breakers	STREETLIGHTS 1, 2 AND 3	6mm
(iv)	Light	LIGHT	6mm
(v)	Earth Fault indicator	EARTH FAULT INDICATOR	6mm
(vi)	Plug	PLUG	6mm

8. SPARE FUSES

One set of fuses of the minisub capacity shall be included in the miniature substation units.

9. EARTHING

A continuous copper bar of 25 x 6mm shall be installed as a substation earth conductor from the H.T. compartment through the transformer section to the L.V. compartment.

10. INFORMATION OF TRANSFORMER TO BE PROVIDED BY BIDDER

- Overall dimensionmmx mmx mm
- Winding material HV.....
LV.....
- Mass of core and windings:..... kg
Complete transformer:..... kg
- Oil capacity: Lt
- Impedance voltage: %
- Losses at rated voltage and frequency
No loadW
LimitsW
- Temperature rise at rated voltage and power of:
Windings °C
Top Oil °C
- Drawings: Drawings showing the dimensions of the transformers offered, the arrangement of the connections and the position of the tapping switch are required with the tender.
- Variations.

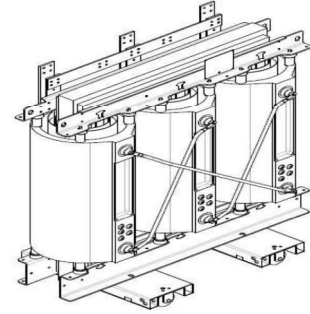
**General specification for three-phase
Cast Resin Transformers – HV/LV
Power 100 to 3150 kVA**

1 - Scope

Three-phase transformers of cast resin type, class F insulation system with natural (AN) cooling for indoor installation, destined for use in three-phase HV/LV distribution systems.

If required forced cooling (AF) to increase the rated power up to 40%.

On request, the initial guarantee can be extended to 5 years, subject to validation of the first commissioning procedure, as advised by the supplier.



2 - Standards

These transformers will be in compliance with the following standards:

- IEC 60076-11
- prEN 50541-1

Specific Standards according to country requests

These transformers will be manufactured in accordance with:

- a quality system in conformity with ISO 9001
- an environmental management system in conformity with ISO 14001, both certified by an official independent organisation.

3 - Description

2.0 3.1 - Magnetic core 3.0

1. This will be made from laminations of insulated silicon steel and will be protected against corrosion with a coat of varnish.

In order to reduce the power consumption due to transformer no-load losses, the magnetic core is stacked using overlapping-interlocking technology.

In order to reduce the noise produced by the magnetic core, it is equipped with noise-damping devices.

4.0 3.2 - LV windings 5.0

The LV winding is produced using aluminum or copper foils (according to the manufacturer's preference) in order to cancel out axial stress during short circuit; this foil will be insulated between each layer using a heat-reactivated class F pre-impregnated epoxy resin film

The ends of the winding are protected and insulated using a class F insulating material.

POLOKWANE SOFTBALL STADIUM

The whole winding assembly will be polymerized throughout by being autoclaved for 2 hours at 130°C, which will ensure:

- High level of resistance to industrial environments
- Excellent dielectric withstand
- Very good resistance to radial stress in the instance of a bolted short circuit.

6.0 3.3 - HV windings

7.0

They will be separated from the LV windings to give an air gap between the MV and LV circuits in order to avoid depositing of dust on the spacers placed in the radical electrical field and to make maintenance easier.

These will be made of aluminium or copper wire or foil (according to the manufacturer's preference) with class F insulation.

The HV windings will be vacuum cast in a class F fireproof epoxy resin casting system composed of:

- an epoxy resin
- an anhydride hardener with a flexibility additive
- a flame-retardant filler.

The flame-retardant filler will be thoroughly mixed with the resin and hardener. It will be composed of trihydrated alumina powder (or aluminium hydroxide) or other flame-retardant products to be specified, either mixed with silica or not.

The casting system will be of class F. The interior and exterior of the windings will be reinforced with a combination of glass fibre to provide thermal shock withstand

8.0 3.4 - MV winding support spacers

9.0

These will provide sufficient support in transport, operation and during bolted short circuit conditions as well as in the case of an earthquake.

These spacers will be circular in shape for easy cleaning. They will give an extended tracking line to give better dielectric withstand under humid or high dust conditions.

These spacers will include an Elastomer cushion that will allow it to absorb expansion according to load conditions. This Elastomer cushion will be incorporated in the spacer to prevent it being deteriorated by air or UV.

10.0 3.5 - HV connections

11.0

The HV connections will be made from above on the top of the connection bars. Each bar will be drilled with a 13 mm hole ready for connection of cable lugs on terminal plates.

The HV connection bars will be in rigid copper bars protected by heat shrinkable tubing.

HV connections in cables are not allowed, in order to avoid all risk of contact, due to cables flapping.

The HV connections will be in copper.

12.0

13.0 3.6 - LV connections

14.0

The LV connections will be made from above onto bars located at the top of the coils on the opposite side to the HV connections.

POLOKWANE SOFTBALL STADIUM

Connection of the LV neutral will be directly made to the LV terminals between the LV phase bars.

The LV connection bars will be in copper or in tinned aluminium (according to preference of the manufacturer).

The output from each LV winding will comprise a tin-plated aluminum or copper connection terminal, enabling all connections to be made without using a contact interface (grease, by-metallic strip: out of scope of supplying).

These will be assembled according to current practices, notably using spring washers under the fixings and nuts.

Devices in the 630 to 2500 kVA range will be easy to connect using factory-built electrical ducting through an optional interface. Stress withstand in the instance of a bolted short circuit on the connector will be guaranteed by the manufacturer.

15.0 3.7 - HV tapping

16.0

2. The tapping which act on the highest voltage adapting the transformer to the real supply voltage value, will be off-circuit bolted links.

Tapping with connection cables are not allowed.
These bolted links will be attached to the HV coils.

4 - Accessories and standard equipment

These transformers will be equipped with:

- 4 flat bi-directional rollers
- lifting lugs
- haulage holes on the undercarriage
- 1 earthing terminals
- 1 rating plate
- 1 "Danger Electricity" warning label (T 10 warning)
- 1 routine tests certificate
- 1 instruction manual for installation, commissioning and maintenance in English.

5 - Thermal protection

These transformers will be equipped with a thermal protection device which will comprise:

- thermal detection systems (1 by phase), installed in the active part of the transformer. The sensors will be placed in a tube to enable them to be replaced if ever necessary.
- An electronic converter with two independent monitoring circuits equipped with a changeover switch, one for "Alarm 1" the other for "Alarm 2". The position of the relays will be indicated by different coloured indicator lights. A third indicator light will indicate the presence of voltage.
- These three indicator lights will be on the front of the converter. The electronic converter will be installed away from the transformer.

POLOKWANE SOFTBALL STADIUM

- A plug-in terminal block for connection of the sensors to the electronic converter.

The sensors will be supplied assembled and wired to the terminal block fixed on the upper part of the transformer. The converter will be supplied loose with the transformer, packaged complete with its wiring diagram.

6 - Metal enclosure

On request, these transformers will be equipped with a metal enclosure for indoor installation comprising an integral IP 31 (except the base which may be IP 21) metal enclosure, that can be dismantled on request, with:

On request specified in the annex, these transformers can be supplied mounted equipped with protective metal enclosure:

- either for indoor installation, with degree of protection IP 31 (except the bottom which may be IP 21),
- or for outdoor installation with degree of protection IP 35 (except the bottom which may be IP 31). This outdoor installation will require some adjustments related to weather and environmental extremes of the place.

These enclosures will not be dismantled (if requested, it can be dismantled) with:

- an anti-corrosion protection in the manufacturer's standard colour
- lifting-lugs enabling the transformer and enclosure assembly to be handled.
- a bolted access panel on the enclosure front to allow access to the HV connections and to the tapping. This will be fitted with handles; it will have one "Danger Electricity" warning label ("T10 "warning), a rating plate and a visible braid for earthing.
- blanked off holes for fitting on the bolted access panel to enable it to be locked.
- undrilled gland plates on the roof: one on the HV side, one on the LV side (drilling and cable gland not supplied).
- 1 plate at the right HV side on the bottom of the enclosure for the HV cables for connections from the bottom.
- as an option, a HV cables clamping system shall be provided when the cables are coming from the bottom

7 - Electrical protection

7.1 - Protection relay

The installation must have a protection relay to protect the transformer from:

- overload,
- short-circuit (internal or external),
- earth fault,
- overflow.

7.2 - MV surge arresters

It is advisable to check that the installation will not be subjected to overvoltage of any kind (atmospheric or switching overvoltage).

POLOKWANE SOFTBALL STADIUM

If there is a risk, the transformer should be protected by phase-earth surge arresters installed directly on the MV connection terminals (top or bottom).

Phase-earth surge arresters are absolutely essential in the following cases:

- If the lightning impact level N_k is greater than 25. The risk of direct or induced atmospheric overvoltage is directly proportional to N_k .
- During the occasional switching (less than 10 operations a year) of a transformer with a weak load, or during a magnetisation period.

They are highly recommended in the following case:

- If the substation is supplied by a network including overhead parts, then a cable which is longer than 20 m (for example, an overhead-underground network).

7.3 – RC filters (repetitive switching operations)

If the installation is likely to be subjected to repetitive switching operations (e.g. connected with a process), it should be protected from the resulting surges, which are particularly harmful to the transformer..

The ideal solution for protecting the installation completely from these surges (with high frequency oscillations), consists in fitting an RC damping filter between the phases and the earth.

This RC filter should be placed as close as possible to the transformer's primary terminals.

This gets rid of the high frequency phenomenon, and limits voltages at the transformer terminals.

The filter should consist of 3 50 Ohm resistors (of the RWST type), and 3 0.25 μF capacitors, insulation level 24 kV.

It may be placed either in a separate metal enclosure or, preferably, inside the metal enclosure of the transformer.

8 - Electrical tests

17.0

18.0 8.1 - Routine tests

19.0

These tests will be carried out on all the transformers after the manufacturing, enabling an official test certificate to be produced for each one:

- measurement of windings resistance
- measurement of the transformation ratio and vector group
- measurement of impedance voltage and load loss
- measurement of no-load loss and no load current
- applied voltage dielectric test
- induced voltage dielectric test
- measurement of partial discharges. For this measurement, the acceptance criterion will be:
 - partial discharges less than or equal to 10 pC at 1.30 U_n , or
 - partial discharges less than or equal to 5 pC at 1.30 U_n (Special test)

(All these tests are defined in the IEC 60076-11 and IEC 60076-1 to 60076-3 standards).

When transformers are equipped with a protection enclosure, (see § 6), they will be **tested in their enclosure**.

POLOKWANE SOFTBALL STADIUM

8.2 - Type tests or special tests

20.0

3. These tests can be requested as option, but are subject to prior agreement of the supplier:

- temperature rise test carried out in accordance with the simulated loading method as defined by the IEC 60076-11 standard
- lightning impulse test in accordance with IEC 60076-3
- short circuit test in accordance with IEC 60076-5
- noise level measurements in accordance with IEC 60076-10.

(All these tests are defined by the IEC 60076-11 and IEC 60076-1 to 60076-5 standards).

9 - Climatic and Environmental classifications

These transformers will be of environmental class E3 and of climatic class C2 as defined in IEC 60076. E3 and C2 classes will be indicated on the rating plate.

The manufacturer must produce a test report from an official laboratory for a transformer of the same design as those produced.

The tests must have been performed in accordance with IEC 60076-11 for C2 climatic class and IEC 60076-16 for E3 environmental class.

On request, temperature behaviour at -50°C can be specified and will be applicable for transportation, storage and running of the transformer.

10- Fire behaviour classification

These transformers will be of class F1 as defined in IEC 60076-11. F1 class will be indicated on the rating plate.

The manufacturer must produce a test report from an official laboratory on a transformer of the same design as those produced and on the same transformer which have initially passed the here above Climatic and Environmental tests.

This test must have been performed in accordance with IEC 60076-11.

Technical Data

For each requested transformer, the supplier will give the following data:	
Rated power	
Cooling.....	
Quantity	
Rated frequency	5
Rated primary voltage	
Rated primary insulation level.....	
Applied voltage to industrial frequency	
Basic Impulse Level (BIL)	
Off-circuit tapping	
Secondary voltage at no load	
- between phases	
- phase to neutral.....	
Rated secondary insulation level.....	
Applied secondary voltage to industrial frequency	
Vector group	D yn
No load losses	
Load losses at 75° C.....	
Load losses at 120° C.....	
Rated impedance voltage at 120° C	
Acoustic power L _w (A)	
Acoustic pressure at 1 metre L _p (A)	
Maximum ambient temperature	
Maximum altitude.....	
HV winding temperature class	
LV winding temperature class	
Temperature of insulation system.....	
Climatic classification	
(*) C2 Climatic test carried out at -50°C	
Environmental classification	
Fire behaviour classification	
Minimum temperature (transportation, storage and operation) :	
Enclosure	
Index of protection :	
Length	
Width	
Height	
Total weight	
Thermal protection relay, electronic converter type:	

(1) For 100 kVA power, the vector group can be : Yzn 11

(2) Delete as appropriate

POLOKWANE SOFTBALL STADIUM

POLOKWANE SOFTBALL STADIUM GENERATOR SPECIFICATIONS

ENGINE SPECIFICATIONS	SCHEDULE A	SCHEDULE B
Engine make		
Diesel generator model		
Displacement	22.921L	
Cylinder bore/Stroke	160mm x 190mm	
Fuel system	Electronic	
Cylinders	6	
Standby power @ 1500rpm		
Base power @ 1500rpm		
Diesel tank capacity	1050L	
Fuel consumption standby	203 l/h	
Fuel consumption prime	175 l/h	
Fuel consumption 75% prime	132 l/h	
Fuel consumption 50% prime	88 l/h	
Oil Type	15W40	
Oil capacity	120l	
Coolant capacity (Including radiator)	120l	
Starter	24V DC	
Governor system	Electronic	
Engine speed	1500rpm	
Engine coolant flow	10 l/sec	
Firing order	1-5-3-6-2-4	
Compression ratio	13.6:1	
ALTERNATOR SPECIFICATION	SCHEDULE A	SCHEDULE B
Alternator brand		
Standby power output	400kVA	
Prime power output	400kVA	
Insulation class	H	
Type	Brushless	
Phase and connection	Three phase, four wire	
AVR	Yes	
AVR model		
Voltage regulation	± 1%	
Voltage	400/230V	
Rated frequency	50Hz	
Voltage regulate change	≤ ±10% UN	
Phase change rate	± 1%	
Power factor	0.8	
Protection class	IP23	
Stator	2/3 pitch	
Rotor	Single bearing	

POLOKWANE SOFTBALL STADIUM

GENERAL SPECIFICATIONS	SCHEDULE A	SCHEDULE B
Structure	Silent weather resistant enclosure	
Dimensions Length x Width x Height	3900mm x 2300mm x 2000mm	
Dry weight	7100kg	
ATS unit included	Yes	

43. Colour Coding of Electrical Equipment

POLOKWANE SOFTBALL STADIUM

Normal / Non-essential Supply: White
 Emergency / Essential Supply: Signal Red (SANS 1091 Code A11)
 UPS Supply: Blue (SANS 1091 Code F01)

All cover plates shall be PVC and white in colour with 3mm engraved lettering indicating distribution board and circuit number.

COLOUR CODING OF LIGHT SWITCHES

POWER SOURCE	COVER PLATE COLOUR	SWITCH COLOUR	LABEL TYPE	CONTENTS ON LABEL	LETTER SIZE
NORMAL	White	White	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the switch as per example. DBA/L1	3mm
ESSENTIAL	White	Red	White letters on red Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the switch as per example. DBAE/L1	3mm
UPS	White	Blue	White letters on blue Ivorene label or Blue engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the switch as per example. DBAU/L1.	3mm

Note: All light switches fed from a circuit connected to an Earth Fault Monitor Supply shall be equipped with double pole switches.

POLOKWANE SOFTBALL STADIUM

COLOUR CODING OF SOCKET OUTLETS

POWER SOURCE	COVER PLATE COLOUR	SWITCH COLOUR	LABEL TYPE	CONTENTS ON LABEL	LETTER SIZE	EARTH PIN	FEMALE SOCKET
NORMAL	White	White	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the switch as per example. DBA/P1/1 Each socket outlet on a circuit shall be labeled.	3mm	Round	White
ESSENTIAL	White	Red	White letters on red Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the switch as per example. DBAE/P1/1 Each socket outlet on a circuit shall be labeled.	3mm	Round	White
UPS	White	Blue	White letters on blue Ivorene label or Blue engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the switch as per example. DBAU/P1/1 Each socket outlet on a circuit shall be labeled.	3mm	Round	White
DEDICATED This socket outlet shall be used for computer equipment only and shall not be on earth leakage units.	Red	Red	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the socket outlet as per example DBA/PD1/1 Each socket outlet on a circuit shall be labeled.	3mm	Chamfered	Red

POLOKWANE SOFTBALL STADIUM

COLOUR CODING OF ISOLATORS EQUIPMENT

POWER SOURCE	COVER PLATE COLOUR	SWITCH COLOUR	LABEL TYPE	CONTENTS ON LABEL	LETTER SIZE	Comments
NORMAL	White	White	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the isolator as per example DBA/S1	3mm	
ESSENTIAL	White	Red	White letters on red Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the isolator as per example DBAE/S1	3mm	Where red switches are not obtainable the illuminated type red switch may be used or a white switch may be used but the switch shall be tagged with a non-removable red sticker.
UPS	White	Blue	White letters on blue Ivorene label or Blue Engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number and Circuit number feeding the isolator as per example DBAU/S1	3mm	Where blue switches are not obtainable the illuminated type blue switch may be used or a white switch may be used but the switch shall be tagged with a non-removable blue sticker.

POLOKWANE SOFTBALL STADIUM

DISTRIBUTION BOARDS, KIOSKS AND LOW TENSION SWITCHBOARDS

POWER SOURCE	COLOUR OF DISTRIBUTION BOARD, KIOSK, LOW TENSION SWITCHBOARDS	COVER OF FACE PLATE	LABEL TYPE	CONTENTS ON EXTERNAL LABEL	CONTENTS OF INTERNAL LABEL ON FACE PLATE	LETTER SIZE	LABELLING OF CABLES
NORMAL	Distribution Boards in Buildings White or Beige Outdoor Kiosk and Low Tension Switchboards Electric Orange	Distribution Boards in buildings White or Beige Outdoor Kiosk and Low Tension Switchboards Electric Orange	Black engraved letters on white Ivorene label. Ivorene label super-glued or pop riveted to face plate or frame.	Distribution Board Number as per example DBA.	Distribution Board Number Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction.	Label of Distribution Board: 6mm Label on Face Plate: 3mm	All incoming and outgoing cables shall be labeled with Ivorene labels indicating the size of the cable.
ESSENTIAL	Distribution Boards in buildings White or Beige Outdoor Kiosk and Low Tension Switchboards Electric Orange	Distribution Boards in buildings Red Outdoor Kiosk and Low Tension Switchboards Red	White engraved letters on red Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number as per exable DB AE.	Distribution Board Number Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction.	Label of Distribution Board: 6mm Label on Face Plate: 3mm	All incoming and outgoing cables shall be labeled with Ivorene labels indicating the size of the cable.

POLOKWANE SOFTBALL STADIUM

UPS	Distribution Boards in buildings White or Beige Outdoor Kiosk and Low Tension Switchboards Electric Orange	Distribution Boards in buildings Blue Outdoor Kiosk and Low Tension Switchboards Blue	White engraved letters on blue Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Distribution Board Number as per example DBAU.	Distribution Board Number Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction.	Label of Distribution Board: 6mm Label on Face Plate: 3mm	All incoming and outgoing cables shall be labeled with Ivorene labels indicating the size of the cable.
-----	---	--	---	--	--	--	---

45. SCHEDULE OF LUMINAIRES

TYPE	DESCRIPTION
B1	As Per Bill & Engineers Instruction
B2	As Per Bill & Engineers Instruction
B5	As Per Bill & Engineers Instruction
D1	As Per Bill & Engineers Instruction
F2	As Per Bill & Engineers Instruction
F3	As Per Bill & Engineers Instruction
F4	As Per Bill & Engineers Instruction
F6	As Per Bill & Engineers Instruction
F7	As Per Bill & Engineers Instruction
S1	As Per Bill & Engineers Instruction

Note:

- 1) All discrepancies and dimensions to be discussed with the electrical engineer prior to commencing with any work.
- 2) All electrical layouts on drawing are schematic layouts only – not to be scaled for installation purposes.
- 3) Sample light must be brought to site for approval by Engineer/Client prior to ordering or installing luminaires.

POLOKWANE SOFTBALL STADIUM

Luminaire Schedule
Project Number: TSN-MKN-808
Schedule Number : POLOKWANE 00001

Polokwane Softball Stadium

FOR INFORMATION PURPOSES

Luminaire Type	Description	Possible Supplier	Position	Product Name/Code	Image	QTY Ground Floor	QTY First Floor	QTY Second Floor	Comment
B	BEKA SERIES 300 21W 4000K BLACK-FP	Beka- Schreder	Bulkhead, Ceiling Mount	S300020021000P	 SERIES 300 LED bulkhead IP 65 21W 2,670lm				
B1	BEKA SERIES 30 BLACK 4000K 15W-FP	Beka- Schreder	Bulkhead, Outside lighting, wall mount	S31B0300415000P	 SERIES 30 LED bulkhead range IP 65 Max. 15W Up to 2,250lm				
D	BEKA RONDO MIDI RECESSED D/L 7W 4000K-FP EMERGENCY	Beka- Schreder	Offices, board rooms, entrance alley, stations	RNMD000710001P	 BEKARONDO-MIDI Circular aluminium reflector LED downlight IP 20 Max. 15W Up to 2,100lm				
DL	BEKA RONDO MIDI RECESSED D/L 7W 4000K-FP	Beka- Schreder	Offices, board rooms, entrance alley, stations	RNMD000710001P	 BEKARONDO-MIDI Circular aluminium reflector LED downlight IP 20 Max. 15W Up to 2,100lm				

F6	BEKA VAPOURLINE 4FT 43WATT 4000K-FP	Beka- Schreder	Food hall, kitchen, scullery & store rooms	LNL0901100000000F	 BEKA VAPOURLINE Industrial LED luminaire IP 65 Max. 49W Up to 8,170lm				
F3	BEKA LED PANEL 600X 600 36WATT 4000K-FP	Beka- Schreder	Offices, administration	LPAN040600000100 OP	 LED PANEL LED ceiling panel IP 20 Max. 60W Up to 5,850lm (output flux)				
F4	BEKA LED PANEL 1200X 600 65WATT 4000K-FP	Beka- Schreder	Kitchen	LPAN041200000100 OP	 LED PANEL LED ceiling panel IP 20 Max. 65W Up to 5,850lm (output flux)				
F2	BEKA VAPOURLINE 4FT 43WATT 4000K-FP EMERGENCY	Beka- Schreder		VNL0901100000000 P	 BEKA VAPOURLINE Industrial LED luminaire IP 65 Max. 49W Up to 8,170lm				
G	ECOBAY RP 186WATT 4000K BLACK-FP	Beka- Schreder	Canopy	EBYR00210121002P	 ECOBAY RP Economical LED lowbay and highbay IP 66 Max. 186W Up to 26,176lm				

S1/S2	BEKA VERTICE-R 38WATT 4000K BLACK-FP Complete with black GRP pole 5m MH	Beka- Schreder	Outside lighting, security lighting	VTCR00020001100P & BGRP030500100010 0100P & 513930300000 & 513910800000 & 300045050010	 VERTICE Versatile LED post top range IP 66 Max. 38W Up to 5.8000m LUMEN 80 000				
BL1	BEKA SEMITA 21WATT 4000K BOLLARD BLACK-FP	Beka- Schreder	Landscape Lighting & Side Walks	SMTA00001010031P	 SEMITA LED bollard luminaire IP 66 21W 3,020lm				
B6	Genrack Corrosion proof protected enclosed dust & water resistant luminaire 180w LED 1200 mm long light fitting, IP66	Beka, Genesis One, Province Lighting or similar	Canopy	Genrack					
X	BEKA DUISA D-ECOLD P130- 3 EXIT CLRE-FP	Beka- Schreder	Exit points	DUIS00001170P	 DUISA Emergency LED signage range IP 43 / 66 130lm				
CB	Omniblast Maxi 144 LED	Beka- Schreder	Canopy Floodlight	QVAL020000100000 P					

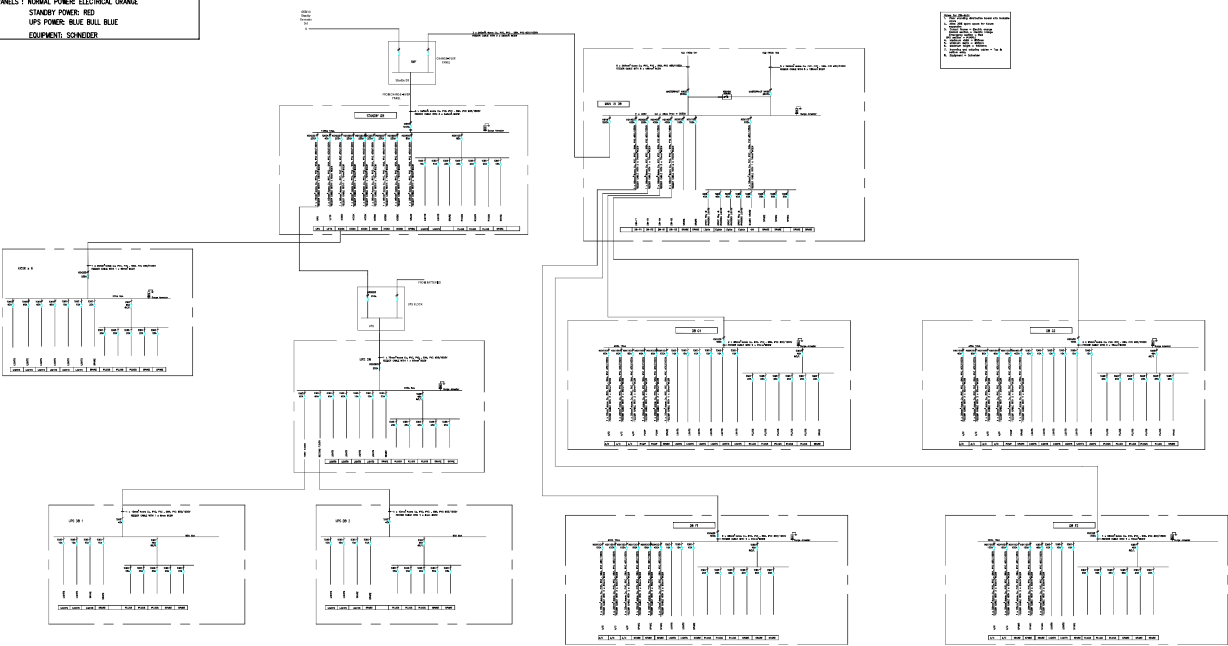
UP1	BEKA LEDDUO DBL SQ 7WATT/7WATT 4000K BLACK-FP	Beka- Schreder	Decorative, Verandah, concrete mount	LDU00311010000P	 BEKA LEDDUO/SQUARE Decorative wall mounted LED luminaire IP 65 DIMM Up to 1,780lm				
-----	---	----------------	--	-----------------	---	--	--	--	--

Notes

- 1. All light fitting color to match the wall color or else other light fittings.
- 2. All light fitting are LED type luminaires

DESIGNATION OF DISTRIBUTION BOARD – DBLT
TYPE OF BOARD : 500-FLUSH MOUNTED ON 220mm BRICK WALL,
OR IN DRY WALL WITH PADLOCKABLE DOOR
ACCESS : FRONT ONLY
MAX. DIM : 800mm WIDE x 800mm HIGH x 150mm DEEP
FEEDERS : AS SHOWN
CABLE ENTRIES : TOP
CONDUIT ENTRIES : TOP & BOTTOM
PROSPECTIVE FAULT CURRENT : 20KA
FUTURE EXPANSION : 20%
FINISHING COLOURS :
DOORS & FRAME: ELECTRIC ORANGE
PANELS : NORMAL POWER: ELECTRICAL ORANGE
STANDBY POWER: RED
UPS POWER: BLUE BULL BLUE
EQUIPMENT: SCHNEIDER

DO NOT SCALE



0	2022/03/28	0	ISSUED FOR CONSTRUCTION	N,N	N,N
REV	DATE	BY	DESCRIPTION	CHK	APD
DRAWING STATUS: CONSTRUCTION					



260 Church Street Cnr Witkoppen Road
Jukuks Park
Johannesburg
2186
P.O. Box 944
Jukuks Park
2153
CONSULTING ENGINEERS
Civil, Structural Engineers & Project Managers
TEL: 011 704 0253 FAX: 011 704 0037

CLIENT:
PO Box 111
POLOKWANE
0300
T4 015 290 3300
Fax 015 290 2100
ARCHITECT:

PROJECT:
NEW POLOKWANE SOFTBALL
STADIUM FOR THE CITY OF
POLOKWANE
TITLE:
DBLT
SINGLE LINE DIAGRAM
LAYOUT

SCALE @ A1	CHECKED:	APPROVED:
NTS	N,N	C.S
DRAWN:	DESIGNED:	DATE:
N,N	N,N	2022/03/28
PROJECT NO:	DRAWING NO:	REV:
TSN-MKN	TSN-MKN-SLD-LT	0

ANNEXURE B-MECHAINICAL WORKS SPECIFICATION



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE



**NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE
PORTION 10 STERKLOOP 688-LS POLOKWANE**

POLOKWANE

WET SERVICES SPECIFICATION

MECHANICAL ENGINEERS



MAKONE CONSULTING ENGINEERS

Tel: 011 704 0253

Fax: 011 704 0037

Email: nkololo@makone.co.za

Website: www.makone.co.za



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

**SPECIFICATION FOR INTERNATIONAL SOFTBALL STADIUM IN
POLOKWANE (PM148/2019)**

**SPECIFICATION FOR THE CONSTRUCTION OF A NEW INTERNATIONAL
SOFTBALL STADIUM IN POLOKWANE**

HOT WATER EQUIPMENT PARTICULAR SPECIFICATION

FC **HOT-WATER GENERATING INSTALLATIONS**

CONTENTS

FC 01	SCOPE
FC 02	STANDARD SPECIFICATIONS
FC 03	VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
FC 04	OPERATING AND MAINTENANCE MANUALS
FC 05	TRAINING OF OPERATORS FOR THE OPERATION OF THE INSTALLATION AND EQUIPMENT
FC 06	LOGGING AND RECORDING PROCEDURES
FC 07	TESTS AND INSPECTIONS ON COMPLETION OF REPAIR WORK
FC 08	QUALITY ASSURANCE SYSTEM
FC 09	COMMISSIONING AND RECOMMISSIONING OF PLANT AND INSTALLATION
FC 10	GARANTEE OF INSTALLATION AND EQUIPMENT
FC 11	MAINTENANCE TOOLS AND SPARES
FC 12	REPAIR WORK TO INSTALLATIONS, SYSTEMS AND EQUIPMENT
FC 13	MAINTENANCE TO INSTALLATIONS AND EQUIPMENT

FC 01 **SCOPE**

This specification covers the general repair and maintenance of hot-water generating installations for Polokwane Softball Stadium, which include the following:

- (a) Steam generated hot-water heating equipment
- (b) Electrical generated hot-water heating equipment
- (c) Primary and secondary pumps
- (d) Hot-water storage vessels
- (e) Lagging and cladding of vessels and piping systems
- (f) Hot-water reheating vessels
- (g) Corrosion protection linings to storage vessels and reheaters
- (h) Hot, cold and drainage pipework to the plant room installation
- (i) Electrical control systems, wiring and control panels
- (j) Thermostats and safety equipment.

This specification also addresses the training of

- User Client and associates, and
- Maintenance staff.

This specification shall form an integral part of the repair and maintenance contract document, and shall be read in conjunction with the additional and particular specifications.

This specification shall act as a guideline to the particular specification and, in the event of any discrepancies between the Technical Specification and the Particular Specification, the latter shall take precedence.

FC 02 **STANDARD SPECIFICATIONS**

FC 02.01 **GENERAL STANDARD SPECIFICATIONS, REGULATIONS AND CODES**

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

FC 02.01.01 **SABS and other specifications and codes**

- SANS 10400 - The applications of the building regulations
- SANS 10142 - Code of practice for the wiring of premises
- SANS 10140 - Identification colour marking
- SANS 1044 - Parts I to IV: Welding
- SANS 1460 - Copper tubes for domestic plumbing
- SANS 10252 - Parts I and II
- SANS 10103 - The measurement and rating of environmental noise with respect to annoyance and speech communications

SABS Specifications listed on page 3 of the DPW specification OW 371
Atmospheric Pollution Prevention Act, No 45 of 1965

FC 02.01.02 **Department of Public Works specifications**

- OW 371 - Specification of materials and methods to be used (Fourth revision, October 1993)
- STD.PWD.VII - Standard Specification for steam boiler installations
- Standard Specification for electrical installations and equipment pertaining to mechanical installations

FC 02.01.03 **Occupational Health and Safety Act of 1993**

All regulations and statutory requirements as laid down in the latest edition of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) shall be adhered to.

FC 02.01.04 **Manufacturers' specifications, codes of and practice and installation instructions**

All equipment and materials shall be installed, serviced and repaired strictly in accordance with the manufacturers' specifications, instructions and codes of practice.

FC 02.01.05 **Municipal regulations, laws and by-laws**

All municipal regulations, laws, by-laws and special requirements of the Local Authority shall be adhered to unless otherwise specified.

FC 03

VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

The following additional general specifications and requirements shall be read in conjunction with this specification and shall be adhered to unless otherwise specified in the Particular Specification.

FC 03.01

GENERAL REPAIR AND INSTALLATIONS REQUIREMENTS

- (a) All materials and equipment supplied and installed shall be new and of high quality and manufactured to the relevant specifications, suitable for providing efficient, reliable and trouble-free service.
- (b) All work shall be executed in a first-class workman-like manner by qualified tradesmen.
- (c) All equipment, component parts, fittings and materials supplied and/or installed, shall conform in respect of quality, manufacture, test and performance to the requirements of the applicable current SABS specifications and codes, except where otherwise specified or approved by the Engineer in writing.
- (d) All materials and workmanship which, in the opinion of the Engineer, is inferior to that specified for the work, will be condemned. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Engineer.
- (e) The Contractor shall submit a detailed list of the equipment and material to be used to the Engineer for approval before placing orders or commencing installation.
- (f) All new equipment, materials and systems shall be installed and positioned such as to not impede on access routes, entrances and other services. The Contractor shall coordinate these items taking other services and equipment into account.
- (g) All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.
- (h) The Contractor shall make sure that all safety regulations and measures are applied and enforced during the repair and construction periods to ensure the safety of the public and User Client.
- (i) Repair work shall be programmed in accordance with Additional Specification SC: General Decommissioning, Testing and Commissioning Procedures, to ensure the shortest possible down-time of any service and the least inconvenience to the User Client and public. The Contractor shall make sure that the necessary notifications and notices are timeously put into place for these activities.

FC 04

OPERATING AND MAINTENANCE MANUALS

The Contractor shall be responsible for the compilation of an inventory list and operating and maintenance manuals.

All information shall be recorded and reproduced in electronic format, as well as three sets of hard copies to be supplied to the Department.

The operating and maintenance manual to be compiled shall be structured to include at least the following:

(a) System description

Complete system description and the working of the plant.

(b) Commissioning data

Complete commissioning, test and inspection data of systems and equipment.

(c) Operating data

- (i) Systems and equipment running check list and frequency of servicing required;
- (ii) Safety precautions to be implemented;
- (iii) Operator's duties (logging requirements);
- (iv) Lubricating oils and service instructions.

(d) Mechanical equipment

- (i) Description of all major items with the make, model number, names, addresses and telephone numbers of the suppliers, manufacturers or their agents;
- (ii) Design capacities of all equipment, including selection parameters, selection curves, capacity tables, etc;
- (iii) Manufacturer's brochures and pamphlets;
- (iv) Schedule of spares with part numbers recommended to be held as stock;
- (v) Vessels pressure test and certification certificates.

(e) Maintenance instructions

- (i) Schedule of maintenance particulars, frequency of services and replacements;
- (ii) Trouble-shooting guide;
- (iii) Part number of all replacement items and spares;
- (iv) Capacity curves of all pumps;
- (v) Serial numbers of all items of equipment.

(f) Electrical equipment

- (i) Schedule of equipment, indicating manufacturer, type, model number, capacity and addresses and telephone numbers of suppliers;
- (ii) Maintenance instructions;
- (iii) Manufacturer's brochures and pamphlets;
- (iv) Complete as-built circuit diagrams and diagrammatic representation of interconnections of all electrical equipment.

(g) Instrumentation and control

- (i) Description of each control system;
- (ii) Schedule of control equipment, indicating manufacturer, type, model number, capacity and addresses and telephone numbers of suppliers;
- (iii) Maintenance instructions;
- (iv) Manufacturer's brochures and pamphlets.

(h) Drawings

- (i) Paper prints of all as-built mechanical and electrical drawings;
- (ii) Wiring diagrams framed behind glass shall be mounted adjacent to each relevant control panel.

FC 05

TRAINING OF OPERATORS FOR THE OPERATION OF THE INSTALLATION AND EQUIPMENT

The Contractor shall allow and provide for additional training of the User Client's representative(s) as specified and set out in this specification. The objective of this training will be to ensure that the following be achieved:

- (a) The identification of pending faults and repairs at an early stage;
- (b) Reducing the maintenance cost of the equipment to an acceptable level, and maintaining the cost at this level;
- (c) Preventing maloperation of the systems and equipment.

The training course for the User Client's representative(s) shall include at least the following:

- (a) Equipment and component recognition.
- (b) How to operate the equipment including the following:
 - (i) Starting the equipment;
 - (ii) Manual and automatic controlling;

- (iii) Shut-down and isolating of equipment and systems;
- (iv) Cleaning of equipment.
- (c) Emergency procedures to be followed in the case of breakages, system faults, steam cuts, etc.
- (d) Safety precautions to be followed and implemented.
- (e) The identification, reporting and recording of faults and operation of equipment.
- (f) The logging of equipment operation, readings and settings.

FC 06

LOGGING AND RECORDING PROCEDURES

The Contractor shall under this repair and maintenance contract institute a logging and recording system as part of his maintenance control plan. This shall consist of a log and record book, which shall be utilised to log and record all operations, faults, system checks, breakdowns, maintenance visits, inspections, etc.

The logbook shall be kept in a safe place as agreed with the User Client and the Engineer and shall only be utilised by the maintenance personnel, the Contractor and the Engineer. Copies of the monthly entries and recordings into the logbook shall be submitted by the Contractor together with his monthly report to the Engineer.

The logbook shall be structured to include at least the following:

- (a) Weekly inspection and maintenance actions;
- (b) Monthly inspection and maintenance actions;
- (c) Four-monthly inspection and maintenance actions;
- (d) Annual inspection and maintenance actions;
- (e) Breakdown reports;
- (f) Daily system and equipment operating conditions, observations, recordings and measurements;
- (g) Inspection and test comments and reports.

The Contractor shall also institute an attendance register, which shall be kept in a safe place as agreed with the User Client and the Engineer. This register shall be completed by all persons visiting the installation, including:

- (a) Maintenance personnel
- (b) Contractor
- (c) Inspectors
- (d) User client personnel
- (e) Engineer.

The register shall state the date, time-in, time-out, name, company and reason for visit.

A copy of the register shall be submitted by the Contractor together with his monthly report.

FC 07

TESTS AND INSPECTIONS ON COMPLETION OF REPAIR WORK

Except where otherwise provided in the Contract, the Contractor shall provide all labour, materials, power, fuel, accessories and properly calibrated and certified instruments necessary for carrying out such tests. The Contractor shall make arrangements for such tests and he shall give at least 72 hours written notice to the Engineer before commencing the test.

In the event of the plant or installation not passing the test, the Employer shall be at liberty to deduct from the Contract amount all reasonable expenses incurred by the Employer or the Engineer attending the repeated test.

Whenever any installation or equipment is operated for testing or adjusting as provided for above, the Contractor shall operate the entire system for as long a period as may be required to prove satisfactory performance at all times in the occupied space served by that system for up to twenty-four hours a day continuously until the system is handed over.

The Contractor shall provide all labour and supervision required for such operation and the Department may assign operating personnel as observers, but such observation time shall not be counted as instruction time.

After completing the installation or system, all equipment shall be tested, adjusted and readjusted until it operates to the satisfaction and approval of the Engineer.

The Contractor shall submit certificates of tests carried out to prove the efficiency of all equipment, as well as certificates to be obtained from all relevant authorities and statutory bodies, etc.

FC 08 **QUALITY ASSURANCE SYSTEM**

The Contractor shall institute an approved quality assurance (QA) system that shall be submitted to the Engineer for approval. The records of this QA system shall be kept throughout the duration of the Contract and submitted to the Engineer at regular intervals as required.

FC 09 **COMMISSIONING AND RECOMMISSIONING OF PLANT AND INSTALLATION**

FC 09.01 **GENERAL**

On completion of the repair work and/or the installation of new systems the plant and equipment shall be put into operation after all tests and adjustments have been carried out to the satisfaction of the Engineer. Where new plant is installed the Contractor shall run and operate the system for a period of time as specified by the Engineer and train the staff of the User Client to operate and maintain the system.

Logging of the operation of the installations shall commence immediately upon start-up.

The Contractor shall submit a full commissioning report.

FC 09.02 **RECOMMISSIONING OF HOT-WATER GENERATING INSTALLATION AND ANCILLARY EQUIPMENT**

On completion of any repairs the Contractor shall recommission the systems, installation and/or equipment influenced by such repairs.

This operation shall be done strictly in accordance with the manufacturer's specification and relevant standards, norms and specifications from the applicable body, authority and/or department. The operation shall include but not be limited to the following:

- (a) All required pre commissioning mechanical checks
 - (i) Check all steam, water and drain connections (when applicable).

- (ii) Check all moving parts.
- (iii) Check seals, gaskets and joints.
- (iv) Reinstall all plugs and covers and check that they are properly secured.
- (v) Check and record that all lubrication to equipment and components has been done in accordance with manufacturer's specification.
- (vi) Check and ensure that all valves and safety valves are correctly installed and in the correct operating position. Safety valves are to be set in accordance with the required blow-off pressure for the installation.
- (vii) Check and ensure that all control equipment such as pressure-reducing valves, heat control equipment, etc, are set and adjusted to the correct controlling value in accordance with the system parameters and manufacturer's specification.
- (viii) All steam and condensate pre commissioning checks shall be done according to relevant specifications.
- (ix) Check and confirm that all required tests and inspections to storage vessels, primary heater vessels and reheater vessels have been done and that all required certificates are in place.
- (x) Check and ensure that the domestic hot-water and cold-water piping system is operational and that no leaks are present.
- (xi) Check, test and inspect the correct installation and operation of all primary and secondary pumping systems (where applicable).
- (xii) Check that all the required pressure testing to the repaired installations and/or new equipment has been done, witnessed and recorded in accordance with the relevant specifications.
- (xiii) Check, test and inspect all bracketing and supports for the relevant installations and equipment to ensure that they are properly secured and installed in accordance with the manufacturer's specifications and installation specification.
- (xiv) Check, inspect and ensure that all lagging and cladding to the vessels and piping installation are installed and repaired in accordance with the applicable specifications from the relevant controlling authority.
- (xv) Check, inspect and ensure that no leaks to equipment, systems and installations occur.

(b) All required pre commissioning electrical checks

- (i) Check all wiring connections for tightness and repair any hot connections.
- (ii) Check that all electrical equipment has been properly reconnected in accordance with the manufacturer's specification.
- (iii) Perform and record all required electrical insulation tests on equipment.
- (iv) Check and test all controls without livening up electrical equipment.
- (v) Check all motor-driven equipment for correct rotational directions.
- (vi) Check and test the operation of all indication and warning lights.
- (vii) Check, set, record and readjust all equipment control and set points in accordance with manufacturer's specifications.
- (viii) Run all motor-driven equipment for a period to ensure free movement and correct operation.

(c) Commissioning of equipment

On completion of the pre commissioning checks the Contractor shall proceed with the commissioning of the equipment. This shall be done strictly in accordance with the manufacturer's specification and system parameters and shall include but not be limited to the following:

- (i) During the commissioning process all safety and warning system checks are to be performed on the thermostatic control system where applicable.
- (ii) During load conditions the equipment shall be readjusted and finally switched to automatic operation on completion of all automatic control functions for correct operation where applicable.
- (iii) Check that steam pressure valves are readjusted where necessary to the correct set point under load conditions where applicable.
- (iv) Check the operation of all steam trap arrangements where applicable.
- (v) Check that water pressure-reducing valves are adjusted and set to the correct operating value for the specific system.
- (vi) Check the correct operation of all systems. Readjust primary and secondary pumping control equipment where applicable.

- (vii) Test and check for any leaks to the system, equipment and installation.
- (viii) Check for any unnecessary strain to system, equipment and installation due to expansion and contraction.
- (ix) Check the correct functioning of all heating temperature control equipment to ensure the correct switching levels and that all safeties are operational.
- (x) Record temperatures and flow conditions.

The Contractor shall visit, inspect, test and readjust the systems, equipment and installation during the week following the recommissioning to ensure the correct functioning of the equipment and its associated components.

FC 10

GUARANTEE OF INSTALLATION AND EQUIPMENT

The Contractor shall provide guarantees obtained from the manufacturer(s) and/or supplier(s) to the effect that each piece of new equipment, supplied and installed under the repair contract, complies with the required performance and will function as part of the complete system.

All new equipment, including, the complete new installations and the systems as a whole shall be guaranteed for a period of 12 (twelve) months commencing upon the day of issue of a certificate of completion for the repair work of the installation.

FC 11

MAINTENANCE TOOLS AND SPARES

Each installation shall be equipped with the necessary maintenance tools and spares required by the specific type of equipment and installation for the daily operation and maintenance of the system. At the start of the repair and maintenance contract the Contractor shall in the presence of the User Client make an inventory of the existing tools and spares, and any shortfall or damaged tools and spares shall be replaced with new. All replacement tools and spares shall be as specified by the equipment manufacturers. These tools and spares shall be kept in a lockable room or cabinet of which the maintenance supervisor and the Contractor shall carry keys. The Contractor shall on a monthly basis take stock of these items in the presence of the User Client's maintenance supervisor and record and report to the Engineer. Any shortfall shall be replaced by the Contractor as part of his responsibility under this Contract.

The tools and spares to be carried shall include but not be limited to at least the following:

- (a) Tools
 - (i) Grease and oil lubrication equipment;

- (ii) Equipment operating keys and tools.

(b) Spares

- (i) Spare sight glasses for sight glass indicators, seals and gaskets (where applicable);
- (ii) Spare seats, gaskets and gland packings for valves, etc;
- (iii) Spare steam traps, at least one of each type present on the installation (where applicable);
- (iv) Spare pressure gauges, at least one of each range and type;
- (v) Spare electrical elements (where applicable);
- (vi) Spare thermostats, at least one of each type present on the installation (where applicable);
- (vii) Spare pilot lights, contactors, circuit brackets, relays, thermal overloads, etc, for electrical control panels;
- (viii) Spare temperature gauges, at least one of each range and type.

FC 12

REPAIR WORK TO INSTALLATIONS, SYSTEMS AND EQUIPMENT

FC 12.01

GENERAL

During the repair and maintenance contract all the systems, installations and equipment shall be repaired as specified in the Particular Specification. This repair work shall include but not be limited to the specified Particular Specification details.

All repair work shall be executed using approved materials and equipment suitable to the systems and/or installations they serve. The said repair work shall be executed in accordance with the relevant codes of practice, standards, regulations, municipal laws and by-laws, manufacturer's specifications and codes of practice and all additional and particular specifications included in this document.

The repair work items are listed in the Particular Specification and Schedule of Quantities with all relevant details, such as capacity, size, manufacturer, model number, etc.

All repair work shall be executed within the specified durations listed in the Appendix to Tender. All new equipment, materials and systems shall be furnished with a written guarantee of a defects liability period of 12 months commencing on the date of issue of a certificate for completion of the repair work. These guarantees shall be furnished in favour of the Department of Public Works.

Repair work items for the steam generating installations shall be categorised under the following headings:

- (a) General requirements for hot-water generating installations
- (b) Steam and condensate pipework (where applicable)
- (c) Hot-water storage vessels
 - (i) Existing hot-water storage vessels
 - (ii) Electrically driven storage vessels, new hot-water storage vessels
 - (iii) Heating services for hot-water storage vessels.
- (d) Lagging and cladding of vessels and piping
 - (i) Vessel lagging and cladding
 - (ii) Hot-water and hot-water return pipe lagging and cladding
- (e) Pressure testing
- (f) Corrosion protection linings
- (g) Sterilisation of installation
- (h) Heating control equipment
 - (i) Steam heating equipment
 - (ii) Electrical heating equipment
- (i) Instruments and controls
 - (i) Type of instrumentation and controls
 - (ii) Instrumentation and controls, installation requests
- (j) Primary and secondary pumping installations
 - (i) Primary pumping equipment
 - (ii) Secondary pumping equipment
- (k) Domestic hot-water and cold-water pipe installations
 - (i) Strainers
 - (ii) Valves
 - (iii) Air vents
 - (iv) Thermostatic water flow control valve
 - (v) Expansion equipment
 - (vi) Flow meters
 - (vii) Check valves

- (viii) Vacuum breakers
- (ix) Expansion release valve
- (x) Safety valves
- (xi) Pressure gauges

(l) Electrical installations

- (i) Electrical control panels
- (ii) Wiring and cabling.

Any repair work, which may be required on the systems, equipment and installation, shall be executed using approved materials, equipment, methods and tooling suitable for the specific application. The said repair work shall be executed in accordance with the relevant codes of practice, standards, regulations, statutory regulations, manufacturer's specifications and codes of practice and as specified in all additional and particular specifications included in this document.

At the start of the repair and maintenance contract, the repair work specified in the Particular Specification shall be done in accordance with the items listed. Any repair work during the maintenance period shall also adhere to this specification.

FC 12.02 GENERAL REQUIREMENTS FOR HOT-WATER GENERATING INSTALLATIONS

All repair work and new installation of hot-water generating installations shall adhere to the standard specifications of the Department of Public Works and all relevant specifications, norms, standards and regulations applicable to this type of installation, including the following general requirements:

- (a) The hot-water generating installation shall be repaired, installed and maintained as a complete functional unit, with all the responsibilities, functions and operating parameters taken into account to ensure the continuous supply of hot water to the consumer points.
- (b) The hot-water generating installation shall be capable of providing ample supply of hot water to the consumer points by means of ensuring the correct sizing of the hot-water storage and production.

FC 12.03 STEAM AND CONDENSATE PIPEWORK

FC 12.04 HOT-WATER STORAGE VESSELS

FC 12.04.01 Existing hot-water storage vessels

At the start of the maintenance and repair contract the Contractor shall inspect, repair, service, clean out and test all hot-water storage vessels.

The inspection shall include the following:

- (a) Isolate drain, open manholes and clean out hot-water vessels.
- (b) Inspect vessel welds.
- (c) Inspect internal corrosion lining and check for any pit holes and damages to the vessel material and connections.
- (d) Inspect lagging and cladding.
- (e) Inspect condition of all elements, steam heating coils, controls, safety valves, etc.

During this inspection the Contractor shall notify the Engineer in advance to allow the Engineer to witness the Contractor's findings. The Contractor shall submit a written report on the findings.

All manhole and pipe gaskets shall be replaced.
No repair work shall be proceeded with prior to approval from the Engineer.

Should any welding repair work be required it shall be performed by a coded welder in accordance with acceptable practices, codes and norms.

Should the corrosion lining be damaged or corroded, thus necessitating the relining of the vessel, this shall be done with an approved lining suitable for the water quality and operating temperature under which this system is functioning.

All safety valves shall be serviced, overhauled and readjusted to the correct safety pressure blow-off part.

All lagging and cladding shall be inspected, repaired and where necessary replaced.

On completion of all repair and service work the Contractor shall reinstate all equipment, fill the hot-water vessel with water and pressure test it to 1,5 times the permissible operating pressure or allowable test pressure.

On passing of the pressure test the Contractor shall recommission the hot-water vessels and put it back on line.

FC 12.04.02 New hot-water storage vessels

Where new hot-water storage vessels are to be installed it shall be done in accordance with the following specification and on approval of the necessary workshop drawings to be provided by the Contractor.

The storage vessels shall be of the vertical cylindrical type with dished ends on both sides, and shall be manufactured to BS 5500 Category II in mild steel for a

working pressure as indicated for the three systems. A pressure test certificate for each vessel shall be supplied by the manufacturer.

The vessel shall be equipped with at least the following:

- (a) Properly sized flanged manhole for easy access
- (b) Flanged inlets and outlets to SABS 1123 Table 10
- (c) Sparge pipe on the cold-water inlet
- (d) Correctly sized thermometer
- (e) Correctly sized temperature and pressure relief valve
- (f) Air release valve
- (g) Correctly sized pressure gauge
- (h) BSP threaded sockets for thermostats
- (i) 40 mm diameter BSP threaded socket at the lowest point of the storage tank for draining purposes
- (j) 50 mm diameter boss element segments for auxiliary elements.

An expansion relief valve shall be installed on the inlet to the storage vessels for thermal expansion.

Where pipe connections to the storage vessel are done with dissimilar materials (such as copper), isolating flanges shall be used (dielectric coupling).

Before ordering and manufacturing of storage vessels a workshop drawing shall be submitted to the Engineer for approval.

The Contractor shall satisfy himself that access and plant room sizes are to the dimensions on the drawings and that the equipment will fit into the space allowed.

FC 12.04.03 Heating sources for hot-water storage vessels

(a) Electrical elements

Where electrical immersion elements are used to heat the water inside the hot-water storage vessel, these elements shall be replaced at the start of the repair and maintenance contract.

All the thermostat controls and safety cut outs shall be cleared, inspected, tested, adjusted to the set point and where necessary replaced.

(b) Steam heating

Where steam heat exchangers are used to heat the water inside the storage vessel, these coils shall be removed together with the steam chest and associated equipment. The coils shall be descaled, cleaned, inspected and tested.

Where necessary the heat exchanger and/or coils shall be replaced.

FC 12.05 LAGGING AND CLADDING

All lagging and cladding to hot-water vessels, primary heaters, secondary heaters and hot and circulation water piping shall be inspected for defects, damages and shortages at the start of the repair and maintenance contract. The Contractor shall report his findings to the Engineer in writing.

All repairs to be done shall match the existing installation and the Contractor shall ensure that no sharp edges from the metal cladding pose a danger to anybody.

The following specification shall be adhered to:

(a) Vessel lagging and cladding

The storage vessels shall be insulated with an 80 mm thick layer of mineral glass wool with a density of 88 kg/m³ and finally covered with 0,6 mm thick galvanized sheet metal. The sheet-metal work has to be done by a specialist. (All edges are to be rolled and no sharp edges will be allowed.)

(b) Hot-water and return water pipe lagging and cladding

All hot water and hot-water return pipes shall be insulated with preformed fibreglass sections covered with galvanized sheet-metal muffs in a water tight manner. Sheet-metal muffs shall be installed with the joints overlapping at least 50 mm and the longitudinal overlap pointing downwards to prevent ingress of water. The sheet-metal muff shall be strapped with 10 mm galvanized straps by means of a strapping tool with a minimum of 2 straps/section. All pipe bends, T-pieces, etc, shall be insulated with 25 mm diameter fibreglass rope covered with a 12 mm thick layer of self-setting fibre cement. A reinforcing gauze shall be wrapped over the fibre cement while wet and then painted with mastic paint when dry.

Table FC 12.05/1 below provides a guideline for the preformed fibreglass section thickness to be used.

The fibreglass sections shall have a density of 88 at least kg/m³.

TABLE FC 12.05/1: FIBREGLASS SECTION THICKNESS

PIPE SIZE (STEEL)	PIPE SIZE (COPPER)	THERMAFLEX THICKNESS
100 mm dia	108 mm dia	50 mm
80 mm dia	76 mm dia	40 mm
65 mm dia	67 mm dia	40 mm

50 mm dia	54 mm dia	25 mm
40 mm dia	42 mm dia	25 mm
32 mm dia	35 mm dia	25 mm
25 mm dia	28 mm dia	20 mm
20 mm dia	22 mm dia	20 mm
15 mm dia	15 mm dia	15 mm

FC 12.06 **PRESSURE TESTING**

The Contractor shall at the completion of the repair contract arrange for a complete pressure test to be executed on the hot-water generating installation. This shall be done in collaboration with the User Client and Engineer to ensure the minimum down-time of the installation, as well as to establish a suitable period for this pressure test. All leaks shall be repaired and the system shall be tested at the cost of the Contractor. This test shall be witnessed by the Engineer.

The tests shall be performed on all hot-water storage vessels, primary heating vessels, secondary heater vessels and domestic water pipe systems.

All safety and expansion release valves shall be removed and plugged, and on completion these shall be reinstalled.

The systems shall be filled with water after all branches have been plugged, sealed or closed.

The systems shall be hydraulically pressure tested by means of a suitable manually operated or mechanically driven pressure pump.

A pressure of at least 1,5 times the working pressure of the class rating of pipes or fittings shall be applied for a period of time specified in the specifications or as recommended by the manufacturers. (Refer to SABS 1200 for minimum and maximum test pressures.)

Tests should not be performed against closed valves.

Leakage which occurs shall be measured, calculated and checked against the allowable losses, as specified in SABS 1200.

If the completed sections comply with all specifications and pass the tests and inspection, it can be approved and the Contractor may be instructed to recommission the plant.

FC 12.07 CORROSION PROTECTION LININGS

All vessel corrosion protection linings shall be inspected and repaired and/or replaced where necessary.

Repairs shall only be done to linings where the supplier and installer of these linings approve of such repairs. These repairs shall then be done strictly in accordance with the manufacturer's specification and shall be certified by an approved inspection authority.

Where new linings are to be installed, the required preparation work including sand blasting and removal of old lining shall be done in accordance with the recommendation of the supplier of the new lining.

Where new linings are to be introduced they shall be similar or equal to the following:

- (a) Internally coated with a durable, high operating temperature glass flake lining with DTF of one millimetre, similar or equal to a Polygrass VE lining as supplied by Corrocoate, suitable for an operating temperature of 95 °C at the indicated working pressures.

The applications of these linings shall be witnessed and certified as being to the manufacturer's application standards by an approved inspection authority.

- (b) Externally the vessels shall be coated with two coats of red oxide paint.

FC 12.08 STERILISATION OF WATER SIDE OF INSTALLATION

The Contractor shall at the completion of the repair contract sterilise the complete water side of the hot-water system including vessels and pipes.

This shall be done as described in the following guidelines.

- (a) The complete system shall be filled with potable water chlorinated to a concentration of 15 mg of chlorine per litre of water which shall remain in contact with the inner surface of the pipeline for a period of not less than 24 hours. The pipeline shall be filled for sterilising in such a manner that no chlorine shock is created or air is trapped in the pipeline.

- (b) The Contractor shall submit full details of the proposed method for sterilising the pipeline to the Engineer for approval at least 14 days before commencing sterilising.
- (c) The cost of water for filling the pipeline for sterilising shall be borne by the Contractor.
- (d) The Contractor shall provide all materials, tools, equipment and labour necessary to sterilise the pipeline. After sterilising the pipeline the Contractor shall, at no extra cost, empty the pipeline and dispose of the water in a manner approved by the Engineer.
- (e) The Contractor may use the following products as a source of chlorine:
 - (i) Chloride of lime to SABS 295 yielding 33 % free chlorine by mass;
 - (ii) Calcium hypochlorite to SABS 295 yielding 70 % free chlorine by mass;
 - (iii) Chlorine gas applied by chlorinator.
- (f) After sterilisation, an approved water quality test to a minimum number of 10 % of the total water points, randomly selected, evenly spread and marked on drawings, shall be carried out. This test shall include a full bacteriological test as per SABS 241 and the results shall be submitted to the Engineer for inclusion in the Contract documents. Each abortive test shall be for the Contractor's cost.

When tested the water shall comply with the limits given in column 2 or 3, as relevant, of table FC 12.08/1.

TABLE FC 12.08/1: BACTERIOLOGICAL REQUIREMENTS

1 PROPERTY	2 RECOMMENDED MAXIMUM LIMIT	3 MAXIMUM ALLOWABLE LIMIT
Total coliform bacteria count per 100 millilitre	Nil*	5
Faecal coliform bacteria count per 100 millilitre	Nil	Nil
Standard plate count per millilitre	100	Not specified

Note:

* If any coliform bacteria are found in a sample, take a second sample immediately after the tests on the first sample have been completed; this sample shall be free from coliform bacteria.

Not more than 5 % of the total number of water samples (from any one reticulation system) tested per year may contain coliform bacteria.

FC 12.09 HEATING CONTROL EQUIPMENT

The Contractor shall at the start of the repair and maintenance contract inspect, test, repair, readjust, and if necessary replace heating controls for the hot-water system.

This shall include the following:

- (a) Check for correct switching and/or control temperature operating points.
- (b) Check, test and ensure that the safety cut-out mechanisms are in place and switch and/or control at the correct level.
- (c) Ensure that equipment has been installed in accordance with the manufacturer's specification.
- (d) Ensure that all pockets are descaled and free of any defects.

The following control equipment shall be serviced, repaired and where required replaced if damaged beyond repair.

FC 12.09.01 Steam heating control equipment

Where immersed type thermostatic steam control valves are utilised they shall be serviced and repaired as follows:

- (a) Dismantle and strip down thermostatic control valve including removal of pocket.
- (b) Descale and clean all equipment.
- (c) Replace element subassembly if necessary.
- (d) Replace cover joint, gland packing, heater joint, coupling joint and all gaskets where applicable.
- (e) Check valve seat and if necessary reseal.
- (f) Reassemble control valve and reinstall, test and adjust to correct level.

All other type of thermostatic heating control valves shall be serviced, repaired and overhauled in accordance with the manufacturer's specification.

FC 12.09.02 Electrical heating control equipment

All electrical thermostat control equipment shall be serviced and repaired in accordance with the manufacturer's specification.

This shall include the following:

- (a) Dismantle, clean and descale thermostat pockets.
- (b) Test switching actions for correct operation.
- (c) Test safety cut-out switching points for correct operation.

Replace thermostat if the switching does not take place in accordance with the manufacturer's specification.

FC 12.10 PRIMARY AND SECONDARY PUMP INSTALLATIONS

The Contractor shall at the start of the repair and maintenance contract inspect, test, service and if required replace primary and secondary circulating pumps.

The pumps are to be inspected, tested, serviced and repaired together with their associated equipment and pipework. All repair and service work shall be done strictly in accordance with the manufacturer's specification.

The repair work to the pumps and equipment shall include at least the following:

- (a) Inspect and test the pumps for correct operation.
- (b) Replace gland packings, seals and gaskets.
- (c) Inspect and test for any bearing noise and replace if necessary.
- (d) Clean out pump strainers, check non-return valves, valves, etc.
- (e) Test pump motor windings for balance phases, insulation test and check wiring.
- (f) Inspect pump mountings and repair if necessary.

Where in-line glandless canned pumps are used, these shall be inspected, tested, serviced where possible, impeller inspected and cleaned and if found beyond repair, replace with a suitable replacement in accordance with the operating parameters.

FC 12.11 DOMESTIC HOT AND COLD WATER INSTALLATIONS

The Contractor shall at the start of the repair and maintenance contract inspect, tests, service, repair and if required, replace damaged items on the complete hot and cold-water piping installation inside the hot-water generating plant rooms

Repair work to the domestic hot and cold-water installation networks shall be as detailed in the Particular Specification and shall include, but not be limited to the following:

- (a) Replace damaged, broken, leaking and corroded above and underground pipework, fittings and equipment.
- (b) Repair, replace and service valves, including new gaskets, gland packings, seals, bolt and nuts, etc.

- (c) Test the proper closing of all valves and where valves do not close properly, the valves shall be refurbished, descaled and if necessary replaced.
- (d) Repair, clean and service all strainers including replacement of strainer elements where corroded and installation of new gaskets.
- (e) Repair, service, test and readjust pressure-reducing valves. Pressure gauges shall be recalibrated and checked. Up and downstream pressures are to be logged. Downstream pressure to be adjusted to an acceptable level taking the allowable working pressure of the system and its components into account.
- (f) Repair, service and check the proper functioning of all non-return valves.
- (g) Repair, service, readjust and calibrate all safety and expansion relief valves.
- (h) Repair, service and clean out all air release valves and vacuum breakers.
- (i) Do repair work to bracketing systems including fixing and repair of existing brackets and the introduction of additional brackets where required.
- (j) Hot-water pipe lagging and cladding shall be inspected, repaired, sealed and replaced where required.
- (k) Repair, service and log readings of water meters including cleaning of integral strainers.
- (l) Water pipes are to be sampled for corrosion and scaling. The Engineer shall evaluate the actions to be carried out if the outcome of this sampling requires attention.
- (m) Water supply shall be sampled and chemically analysed for the suitability to the systems and materials it serves.
- (n) Pressure test and sterilise repaired new installation and equipment.
- (o) Reinstate and make good walls, tiling, floors, concrete, finishes, holes, chases, surfaces, etc, to an acceptable level where any repair, upgrade and/or service work has been executed.

FC 13

MAINTENANCE TO INSTALLATIONS AND EQUIPMENT

FC 13.01

GENERAL

Monthly maintenance responsibilities for each installation including all units and components as specified, shall commence with access to the site. A difference

shall be made in payment for the maintenance prior to and after practical completion of repair work.

Maintenance responsibilities of the completed installation shall commence upon the issue of a certificate of practical completion for repair work, and shall continue for the remainder of the 36-month contract period.

This part of the Contract shall include:

- (a) Routine preventative maintenance;
- (b) Corrective maintenance, and
- (c) Breakdown maintenance,

The maintenance work shall be executed in accordance with the relevant codes of practice, statutory regulations, standards, regulations, municipal laws and by-laws and the manufacturers' specifications and codes of practice.

The maintenance schedules and frequency shall be developed under the maintenance control plan to be instituted by the Contractor.

All new equipment, components and materials supplied and installed under the maintenance contract shall be furnished with a prescribed manufacturer's guarantee.

The maintenance work and items are to be categorised by the Contractor for each maintenance activity under the following headings:

- (a) Steam and condensate pipework (where applicable)
- (b) Hot-water storage vessels
- (c) Heating equipment
- (d) Lagging and cladding of vessels and piping
- (e) Corrosion protection linings
- (f) Circulating pumps
- (g) Domestic hot and cold-water piping systems
- (h) Electrical controls, panels and wiring.

The Contractor shall be remunerated monthly, based on his performance, for maintaining the complete installation in a perfect functional condition.

FC 13.02 ROUTINE PREVENTATIVE MAINTENANCE

The routine maintenance of the installations, systems and equipment shall be done in accordance relevant maintenance specifications and standards.

The routine maintenance work to be performed and executed shall include but not be limited to the items listed in tables FC 13.02/1, FC 13.02/2, FC 13.02/3 and FC 13.02/4 below under the respective headings.

These actions and findings shall be logged and reported on the relevant approved schedules and reports.

TABLE FC 13.02/1: WEEKLY ACTIONS AND MAINTENANCE

ITEM	MAINTENANCE DESCRIPTION	ACTION RESPONSIBILITY	ACTION
1	Inspect equipment, components and installations for any visible defects, leaks, damages and/or pending faults.	Contractor	Check/Record
2	Check and record all pressure gauge temperature and flow meter readings, and readjust equipment if necessary.	Contractor	Adjust/Check/Record
3	Check operation of pumps, heating equipment and controls for correct functioning.	Contractor	Check/Record
4	Check electrical control panels for any faults.	Contractor	Check/Record
5	Report any faults, defects, leaks, damages, etc, to Engineer.	User Client	Check/Record/Report

TABLE FC 13.02/2: MONTHLY ACTIONS AND MAINTENANCE

ITEM	MAINTENANCE DESCRIPTION	ACTION RESPONSIBILITY	ACTION
1	All as listed under table FC 13.02/1	Contractor/ User Client	Check/Record Adjust/Repair/Report
2	Blow down all dirt pockets and record.	Contractor	Service/Record
3	Clean out all stainers and record.	Contractor	Service/Record
4	Check all valve gland seals and packings for leaks and replace and repair if necessary.	Contractor	Check/Service/Repair /Record
5	Check, inspect and repair if necessary all expansion joints for leaks and damages.	Contractor	Check/Repair/Record
6	Check all safety devices for correct operation and repair and replace where necessary.	Contractor	Check/Service/Repair /Record

7	Check and test all electrical control functions and operations. Repair and report any faults and defects.	Contractor	Check/Service/Repair /Record
8	Complete logbook and report.	Contractor	Report

TABLE FC 13.02/3: FOUR-MONTHLY ACTIONS AND MAINTENANCE

ITEM	MAINTENANCE DESCRIPTION	ACTION RESPONSIBILITY	ACTION
1	All as listed under tables FC 13.02/1 and FC 13.02/2.	User Client/ Contractor	Check/Record/Adjust/ Repair
2	Service, repair, clean, replace seals gaskets, reset and/or replace worn parts as directed by the manufacturer of all steam traps (where applicable).	Contractor	Check/Service/Repair /Report
3	Service, repair, replace glasses and gaskets where necessary and clean all sight glasses.	Contractor	Check/Service, Repair, Report
4	Repair lagging and cladding where necessary.	Contractor	Check/Repair/Report
5	Repair all steam leaks.	Contractor	Check/Repair/Report
6	Repair all water leaks.	Contractor	Check/Repair/Report
7	Inspect and test all heating equipment Repair where necessary.	Contractor	Check/Repair/Report
8	Inspect all hot -water storage vessels for any leaks and packing faults. Repair if necessary.	Contractor	Check/Repair/Report
9	Test, inspect and repair all pumps.	Contractor	Check/Service/ Repair/Report
10	Lubricate all lubrication points in accordance with the manufacturer's specification.	Contractor	Check/Service/ Report
11	Complete logbook and report.	Contractor	Report

TABLE FC 13.02/4: ANNUAL ACTIONS AND MAINTENANCE

ITEM	MAINTENANCE DESCRIPTION	ACTION RESPONSIBILITY	ACTION
1	All as listed under tables FC 13.02/1, FC 13.02/2 and FC 13.02/3.	User Client / Contractor	Check/Record/ Adjust/Repair
2	Drain, clean out, inspect and repair all defects and linings on hot-water storage	Contractor	Inspect / Test / Service / Repair

	vessels.		
3	Inspect and repaint all equipment where required.	Contractor	Inspect / Test / Service / Repair
4	Remove, strip, service, repair, adjust and replace where necessary all pressure control and safety valve equipment.	Contractor	Service / Repair / Adjust / Report
5	Complete logbook and report.	Contractor	Report

FC 13.03 CORRECTIVE MAINTENANCE

This corrective maintenance of the installations, systems and equipment shall be done in accordance with relevant maintenance specifications and standards.

The Contractor shall inspect and check all equipment, materials, systems and installation for any pending breakdowns, maladjustments or anomalies of equipment.

The Contractor shall report and take actions to correct such defects.

FC 13.04 BREAKDOWN MAINTENANCE

Breakdown maintenance of the installations, systems and equipment shall be done in accordance with relevant maintenance specifications and standards.

All breakdown problems experienced shall be acted upon within the time limitations allowed in the General Maintenance specifications.

All breakdown maintenance shall be done in accordance with the relevant specifications, standards, regulations and codes.

The Contractor shall have access to the necessary spares, equipment and tools for any possible breakdowns.



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE



**NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE
PORTION 10 STERKLOOP 688-LS POLOKWANE**

POLOKWANE

HVAC PARTICULAR SPECIFICATION

MECHANICAL ENGINEERS



MAKONE CONSULTING ENGINEERS

Tel: 011 704 0253

Fax: 011 704 0037

Email: nkololo@makone.co.za

Website: www.makone.co.za



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

**SPECIFICATION FOR INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE
(PM148/2019)**

**SPECIFICATION FOR THE CONSTRUCTION OF A NEW INTERNATIONAL
SOFTBALL STADIUM IN POLOKWANE**

HVAC PARTICULAR SPECIFICATION

FD **HEATING, VENTILATION AND AIR-CONDITIONING SYSTEMS**

CONTENTS

FD 01	SCOPE
FD 02	STANDARD SPECIFICATIONS
FD 03	VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
FD 04	OPERATING AND MAINTENANCE MANUALS
FD 05	TRAINING OF OPERATORS FOR THE OPERATION OF THE INSTALLATION AND EQUIPMENT
FD 06	LOGGING AND RECORDING PROCEDURES
FD 07	TESTS AND INSPECTIONS ON COMPLETION OF REPAIR WORK
FD 08	QUALITY ASSURANCE SYSTEM
FD 09	COMMISSIONING AND RECOMMISSIONING OF PLANT AND INSTALLATION
FD 10	GUARANTEE OF INSTALLATION AND EQUIPMENT
FD 11	MAINTENANCE TOOLS AND SPARES
FD 12	REPAIR WORK TO INSTALLATION SYSTEMS AND EQUIPMENT
FD 13	MAINTENANCE TO INSTALLATION AND EQUIPMENT

FD 01 **SCOPE**

This specification covers the general repair and maintenance of heating, ventilation and air-conditioning systems at New International Softball Stadium, which include the following:

- (a) Room air-conditioning units with air cooled condensers
- (b) Refrigeration pipework
- (c) Fans and attenuators
- (d) Electric motors
- (e) Air filters
- (f) Canopies and grease eliminators
- (g) Duct work
- (h) Air terminals
- (i) Noise and vibration
- (j) Painting and cleaning
- (k) Labelling and identification.

This specification also addresses the training of

- User Client and associates, and
- Maintenance staff.

This specification shall form an integral part of the repair and maintenance contract document, and shall be read in conjunction with the additional and particular specifications compiled as part of this document.

This specification shall act as a guideline to the Particular Specification and, in the event of any discrepancies between the Technical Specification and the Particular Specification, the latter shall take precedence.

FD 02 **STANDARD SPECIFICATIONS**

FD 02.01 **GENERAL STANDARD SPECIFICATIONS, REGULATIONS AND CODES**

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

FD 02.01.01 **SABS and other specifications and codes**

- SANS 1046 - Copper tube manufacturing code of practice
- SANS 10400 - The applications of building regulations
- SANS 10103 - The measurement and rating of environmental noise with respect to annoyance and speech communication
- SANS 10139 - The prevention, automatic detection and extinguishing of fire in buildings
- SANS 10140 - Identification colour marketing
- SANS 10142 - Code of practice for the wiring of premises
- SANS 10147 - Refrigerating systems, including plants associated with air-conditioning systems
- SANS 10173 - Installation, testing and balancing of duct work
- SANS 1630 - Decorative high-gloss enamel paint for interior and exterior
- SANS 1763 - General coating thickness
- SANS 1238 - HVAC duct construction standards
- Act 103 - National Building Regulations and Building Standard Act, 1977 (Act No 103 of 1977) as amended

FD 02.01.02 **Department of Public Works Specifications**

- OW 371 - Specification of materials and methods to be used (Fourth revision, October 1993)
- STD.PWD.VIII - Standard specification for refrigeration services

FD 02.01.03 **Occupational Health and Safety Act of 1993**

All regulations and statutory requirements as laid down in the latest edition of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) shall be adhered to.

FD 02.01.04 Manufacturers' specifications, codes of practice and installation instructions

All equipment and materials shall be installed, serviced and repaired strictly in accordance with the manufacturers' specifications, instructions and codes of practice.

FD 02.01.05 Municipal regulations, laws and by-laws

All municipal regulations, laws, by-laws and special requirements of the Local Authority shall be adhered to unless otherwise specified.

FD 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

The following additional general specifications and requirements shall be read in conjunction with this specification and shall be adhered to unless otherwise specified in the Particular Specification.

FD 03.01 GENERAL REPAIR AND INSTALLATION REQUIREMENTS

- (a) All materials and equipment supplied and installed shall be new and of high quality and manufactured to the relevant specifications, suitable for providing efficient, reliable and trouble-free service.
- (b) All work shall be executed in a first-class workman-like manner by qualified tradesmen.
- (c) All equipment, component parts, fittings and materials supplied and/or installed, shall conform in respect of quality, manufacture, test and performance to the requirements of the applicable current SABS specifications and codes, except where otherwise specified or approved by the Engineer in writing.
- (d) All materials and workmanship which, in the opinion of the Engineer, is inferior to that specified for the work will be condemned. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Engineer.
- (e) The Contractor shall submit a detailed list of the equipment and material to be used to the Engineer for approval before placing orders or commencing installation.
- (f) All new equipment, materials and systems shall be installed and positioned such as to not impede on access routes, entrances and other services. The

Contractor shall coordinate these items taking other services and equipment into account.

- (g) All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.
- (h) The Contractor shall make sure that all safety regulations and measures are applied and enforced during the repair and construction periods to ensure the safety of the public and User Client.
- (i) Repair work shall be programmed in accordance with Additional Specification SC: General Decommissioning, Testing and Commissioning Procedures, to ensure the shortest possible down-time of any service and the least inconvenience to the User Client and public. The Contractor shall make sure that the necessary notifications and notices are timeously put into place for these activities.

FD 03.02

TESTING OF REFRIGERATION PIPING AND EQUIPMENT

- (a) All new refrigerant pipe installations shall be thoroughly tested to be sure that they are absolutely tight. Nitrogen must be used to pressure test the system at 1, 5 times the working pressure. A pressure-reducing valve must be used to set the test pressure. A leak test must be carried out on the entire system.
- (b) All new refrigerant pipe installations shall be vacuum pumped by means of a suitable vacuum pump. An absolute pressure of 2500 micron must be reached. Allow the system to stand under vacuum for a minimum of 12 hours. If no noticeable rise in pressure has taken place after 12 hours, the system may be charged.
- (c) The dryness of the refrigeration system shall be indicated by an approved moisture indicator.
- (d) Should moisture be present, the system shall be leak tested and the leak repaired. Should no leak be present, the system shall be flushed with dry nitrogen and vacuum pumped again as described above.
- (e) If the completed system complies with all the Specifications and passes the test and inspection, it can be approved and the Contractor may be instructed to recharge the system with the correct refrigerant and refrigerant charge.
- (f) Under no circumstances shall the refrigerant piping/installation be purged.

FD 03.03

REFRIGERANTS

- (a) No CFC refrigerant shall be used in new installations.

- (b) Equipment still running on CFC shall be maintained until such time that a leak occurs or the system has to be decanted. The system shall then be converted to a compatible HCFC or HFC as described in the Montreal Protocol and recommended by the compressor manufacturer.
- (c) Any CFC refrigerant that has to be discharged, shall be decanted by means of an approved reclaiming system, and not discharged to the atmosphere. Should the Contractor not comply with this requirement, full action shall be taken contractually and statutory against him.
- (d) Any refrigeration system not supplied with three-way service valves, shall be provided with Schreuder type service valves. These valves shall be installed on both suction and discharge lines of the compressors. Tap-o-line valves shall not be fitted or used on the systems.
- (e) In the event of an electrical motor burn-out in a hermetic or semi-hermetic compressor, a burn-out drier shall be used. Purging only is prohibited. The burn-out drier shall be installed and removed as per the manufacturer's instructions.
- (f) No synthetic components or solutions shall be used to repair leaks in refrigeration piping, on coils or evaporators. Only approved gas welding shall be used. Should the leak be of such nature that repair is not possible, the item should be replaced.

FD 03.04 FANS AND ATTENUATORS

FD 03.04.01 General

- (a) Requirements under this heading apply to fans that are not integral parts of complete units supplied by recognised suppliers. Selected fans shall be such that the operating point is as close as possible to maximum efficiency.
- (b) Fan motors selected must be capable of supplying not less than 10 % above the specified air quantity without overloading.
- (c) The system resistance must be calculated and the fan selected to meet the required static pressure, taking into consideration the site altitude, system air temperature and air density at which the system duty shall be met. The selection must be submitted to the Engineer for approval before ordering the equipment.
- (d) Belt drives shall be designed for a minimum overload of 25 % and not less than two matched belts may be used.
- (e) Pulleys shall be of the adjustable speed taper-lock type and shall be accurately keyed to the shafts and aligned before the system is put into operation.

- (f) Belt guards shall be supplied in accordance with Occupational Health and Safety Act, No 85 of 1993. The guards shall have an expanded metal front and shall allow oiling and the use of a tachometer without removal of the guard.
- (g) Bearings shall be selected for a minimum life expectancy of 200 000 hours at the given duty.
- (h) Lubrication points shall be readily accessible and shall be extended to the outside to permit lubrication without removal of the fan. Fan shafts shall be suitably protected from rust and corrosion.

FD 03.04.02 Axial flow fans

- (a) Axial flow fans shall be in-line direct-driven type with the motor mounted inside the fan housing.
- (b) Fans shall be of the multi-bladed aerofoil type of a non-ferrous construction. The number of blades vary according to the application. The fans shall be provided with adjustable blade pitch indexed to permit field adjustment.
- (c) Fan casings shall be constructed of hot-dip galvanized mild steel with a minimum thickness of 3 mm and mild steel galvanized flanges on each side drilled for connections to matching flanges on ducting.

FD 03.04.03 Sound attenuators

- (a) Sound attenuators shall be installed in the positions indicated on the drawings and shall be selected to provide the noise criteria levels as specified. All sound attenuators shall be products of an accredited manufacturer who publishes selection data on these products. Data shall be submitted to the Engineer for approval before ordering.
- (b) Metalwork shall be galvanized steel and acoustic insulation shall be non-combustible material, properly bonded and covered so as not to permit particles to be eroded by air moving over it.
- (c) Sound absorbing lining material shall have a density not less than 48 kg/m³ and thickness of not less than 50 mm.

FD 03.05 CANOPIES AND GREASE ELIMINATORS

- (a) Kitchen canopies shall be connected to the extract fan by means of cuts of which the joints and seams are of the welded or soldered construction and shall be watertight. Cleaning openings shall be provided at such intervals on the ducting

that the inside of the ducting can be reached for cleaning purposes. The fan shall be provided with a cleaning access door, as well as a drain point at the bottom.

- (b) Fire dampers, operated with fusible links, shall be provided in each air outlet connection and shall form an integral part of the canopy construction.
- (c) Lights shall be fitted into the canopy by the manufacturer. Access to the tube for tube replacement shall be through the face of the fittings without the use of tools.
- (d) Grease filters shall contain a series of vertical baffles to change the direction of the air flow and efficiently divert grease particles out of the air stream by centrifugal action. Each filter bank shall contain a condensate trough and removable grease storage container.

FD 03.06 DUCT WORK

- (a) This specification covers the air distribution system as shown on the drawings. Duct work shall be manufactured in accordance with the standard specification for air-conditioning duct work, SABS 1238. Duct work shall be erected in accordance with the code of practice for the installation, testing and balancing of duct work, SABS 0173.
- (b) Fittings such as elbows, parallel flow branches, branch connections, off-sets and transitions shall be manufactured and installed in accordance with the SMACNA standards.
- (c) All ducting shall be sufficiently airtight to ensure economical and quiet performance of the system, and joints shall be suitably sealed in accordance with the relevant SMACNA standard with suitable non-combustible filler compound.
- (d) The Contractor shall provide all hangers and supports which are to be hot-dip galvanized after fabrication to SABS 193. No explosive fasteners to the building structure shall be allowed, only approved expanding bolts or clamps are permissible.
- (e) The duct work shall be connected to the air terminals by means of flexible ducting. Flexible ducting shall be coated fibreglass fabric with a mineral base. Flexible ducting shall be installed with "easy" bends of not less than one duct diameter centre line and shall be supported to SMACNA specification to ensure that the ducting does not kink. The length of the flexible duct shall be kept to a minimum and shall not exceed lengths of 1200 mm.

FD 03.07 AIR TERMINALS

- (a) Air distribution shall be effected by means of the supply air grilles as indicated on the drawing. The finish of the grilles shall be epoxy powder-coated, the colour of which shall be advised and approved by the Engineer. Supply air grilles shall be of the double deflection type, consisting of two rows of individually adjustable aerofoil section vanes, front vanes horizontal rear vanes vertical, all vanes housed in a surrounding fixing flange with neat mitred joints in the corner.
- (b) Supply air grilles shall be of steel construction and shall be provided with burglar bars. The inner section will be only accessible from above and the face plate of the grille is fixed from above. No screws or fixing devices are accessible from below.
- (c) Supply grilles are supplied with a plenum box with spigot and connected to the spigot on the ducting by means of flexible ducting.
- (d) Transfer grilles shall be of steel construction and be provided with burglar bars. Standard door grilles may be installed with a burglar bar assembly in between.

FD 03.10 AIR FILTERS

FD 03.10.01 General

- (a) Provide and install air filters in the positions as indicated on the drawings.
- (b) Filters shall be standard products of a reputable manufacturer regularly engaged in the manufacture of the particular filter. The manufacturer shall submit evidence to the satisfaction of the Engineer that the filters have been tested by an independent authority and that they meet the minimum arrestance, efficiency and dust holding capacity.
- (c) Filters shall be tested in accordance with ASHRAE test standard 52 - 76.
- (d) A Megnahelic gauge calibrated from zero to 500 Pa shall be installed, connected with copper tubing to static pressure taps complete with isolating valves.

FD 03.10.02 Primary filters

- (a) Primary filters shall, unless otherwise stated, be washable on woven polyester material, pleated to provide an extended surface with a dust spot efficiency of minimum 40 % and an arrestance of 85 %.
- (b) Media shall be firmly held in place by rustproof wire screens to maintain pleat strength and spacing.
- (c) Media and support screens shall be continuously bonded into aluminium support.
- (d) Frames shall be folded to form a robust media support frame. The bonding between media and frame shall be continuous to prevent leakage.
- (e) Each filter shall be provided with a factory made holding frame, constructed of not less than 1, 0 mm thick galvanized mild steel provided with suitable seals and quick release spring type clips to securely hold the filter cell in place without permitting leakage of air.
- (f) The holding frames of multiple cell filter banks shall be suitably joined and sealed so as to prevent leakage of air between the frames.

FD 03.11 LABELLING AND IDENTIFICATION

All equipment shall be labelled and identified using black Traffolite labels with 10 mm high white lettering on the labels. Labels will be secured using epoxy base glue.

The identification number used on these labels shall correspond with the equipment number on the complete inventory list.

FD 03.12

NOISE AND VIBRATION

- (a) Particular care shall be taken in the selection, application and installation of all equipment used to ensure that the equipment will operate below the required noise level for public areas of NC 35 and with the least vibration possible, all to the satisfaction of the Engineer.
- (b) Equipment shall be mounted on vibration isolators of the correct type and selection depending on deflection requirement and vibrating frequency.
- (c) Anti-vibration connections shall be used on duct work where it joins vibrating equipment such as fans and air-conditioning units.
- (d) Suitable sound attenuating devices shall be incorporated within the duct work to reduce airborne noise to acceptable levels as specified.
- (e) The subcontractor shall provide sound level data to the Engineer on the completion of the installation detailing the noise levels in NC level for each separate area. No measurement shall be taken closer than 1 metre from any outlet.

FD 03.13

PAINTING AND CLEANING

- (a) No untreated metal surfaces shall be allowed on the project. Items which are not galvanized or similarly protected against rust and corrosion shall be painted as detailed below. No equipment, hangers, brackets, etc, shall be delivered to site in unprotected condition; they shall be factory coated with an approved zinc-rich prime coat before being despatched.
- (b) Painting shall comprise the following consecutive processes. Thoroughly clean, descale and degrease all surfaces, apply one coat of approved zinc-rich primer and one coat of universal undercoat, and finish off with two coats of quality high-gloss enamel. Final finish shall be to the full approval of the Engineer.
- (c) Items with galvanized finish, such as cable trays, need not be painted but shall be properly cleaned with suitable galvanized iron cleaning fluid. Where galvanized finish is painted, it shall be primed with a calcium plumbate primer.

- (d) It is not a requirement to paint duct work, conduits or pipework installed in roof voids and shafts, where they are not visible, if they are galvanized. Items as mentioned above shall be properly cleaned and painted as specified above.
- (e) Visible sections of the inside of ducting through grilles shall be painted matt black after degreasing and priming as specified above.
- (f) Plant and equipment shall be painted with the relevant colour in accordance with SABS.

FD 03.14

SELF-CONTAINED AIR-CONDITIONING UNITS

- (a) The self-contained packaged unit shall be a fully catalogued product and documentation shall include performance curves and selection tables.
- (b) Self-contained room air-conditioning units consist of unit casing, compressor, evaporator and fan, condenser and fan, refrigerant pipework with expansion device and the relevant controls. The condenser unit shall form an integral part of the unit or be separate for split applications.
- (c) Unit casings shall be of sheet metal construction with a baked enamel finish to give a corrosion resistance. Units shall be suitably insulated to ensure quiet operation.
- (d) Evaporator fans shall be of the double inlet centrifugal type with integral motor or belt-driven. The fan assembly shall be isolated from the unit by means of rubber mounts and the unit shall operate without vibration.
- (e) Condensate trays shall be manufactured of non-corrosive materials and shall be insulated and condensate shall be piped to the nearest drain point.
- (f) Washable WP 77 filters shall be provided and installed behind the inlet grille and shall be easily removable.
- (g) Compressors shall be of the hermetically sealed dome type with crankcase heaters and suitable vibration isolators.
- (h) Condenser coils shall be copper tubes with aluminium fins for inland use. Condenser fans shall be propeller fans or of the centrifugal type.

FD 04

AS-BUILT INFORMATION AND OPERATING AND MAINTENANCE MANUALS

The Contractor shall be responsible for the compilation of an inventory list and operating and maintenance manuals and system data sheets.

The Contractor shall allow for the required equipment and facilities to establish the correct as-built information.

All information shall be recorded and reproduced in electronic format, as well as three sets of hard copies to be supplied to the Department.

The operating and maintenance manual to be compiled shall be structured to include at least the following:

(a) System description

Complete system description and the working of the plant.

(b) Commissioning data

Complete commissioning, test and inspection data of plant.

(c) Operating data

- (i) Plant running check list and frequency of servicing required;
- (ii) Safety precautions to be implemented;
- (iii) Manual and automatic operation;
- (iv) Maintenance duties and logging required;
- (v) Lubricating oils and service instructions;
- (vi) Pre-start checklist for each system;
- (vii) Starting and stopping procedures.

(d) Mechanical equipment

- (i) Description of all major items with the make, model number, names, addresses and telephone numbers of the suppliers, manufacturers or their agents;
- (ii) Design capacities of all equipment, including selection parameters, selection curves, capacity tables, etc;
- (iii) Manufacturers' brochures and pamphlets;
- (iv) Schedule of spares with part numbers recommended to be held as stock.

(e) Maintenance instructions

- (i) Schedule of maintenance particulars, frequency of services and replacements;
- (ii) Trouble-shooting guide;
- (iii) Part number of all replacement items and spares;
- (iv) Capacity curves of pumps, fans and compressors;

- (v) Serial numbers of all items of equipment.
- (f) Electrical equipment
 - (i) Schedule of equipment, indicating manufacturer, type, model number, capacity and addresses and telephone numbers of suppliers;
 - (ii) Maintenance instructions;
 - (iii) Manufacturers' brochures and pamphlets;
 - (iv) Complete as-built circuit diagrams and diagrammatic representation of interconnections of all electrical equipment.
- (g) Instrumentation and control
 - (i) Description of each control system;
 - (ii) Schedule of control equipment indicating manufacturer, type, model number, capacity and addresses and telephone numbers of suppliers;
 - (iii) Maintenance instructions;
 - (iv) Manufacturers' brochures and pamphlets.
- (h) Drawings
 - (i) Paper prints of all as-built mechanical and electrical drawings;
 - (ii) Wiring diagrams framed behind glass shall be mounted adjacent to each relevant control panel.

FD 05

TRAINING OF OPERATORS FOR THE OPERATION OF THE INSTALLATION AND EQUIPMENT

The Contractor shall allow and provide for additional training of the HVAC maintenance staff as specified and set out in this specification. The objective of this training will be to ensure that the following is achieved:

- (a) Understanding of equipment;
- (b) High plant operating efficiencies to reduce operating costs;
- (c) Reduce the maintenance cost of the plant to an acceptable level, and maintain the cost at this level in so far as they are affected by the operating conditions;
- (d) Prevent the maloperation of the plant and its associated equipment.

In the event of the designated staff not achieving the set goals the Contractor shall be responsible to ensure that such personnel attend an approved maintenance course as available from the Department or manufacturer.

The Contractor shall, in collaboration with the Engineer, ensure that the maintenance personnel be re-evaluated on an annual basis by means of a set examination, to ensure the upkeep of skill level and knowledge.

The evaluation and training course to be utilised for the evaluation of the HVAC maintenance staff shall include at least the following:

- (a) Equipment and component recognition;
- (b) Emergency procedures to be followed in the event of power failure, water shortage, and accidents related to refrigerator systems;
- (c) Safety precautions to be followed and implemented;
- (d) The identification, reporting and recording of faults and operation of equipment;
- (e) The logging of boiler plant operation, readings and setting;
- (f) In the event of plant running on ammonia, the full SAIRAC course on handling ammonia as refrigerant shall be attended by the maintenance staff.

FD 06

LOGGING AND RECORDING PROCEDURES

The Contractor shall under this repair and maintenance contract institute a logging and recording system as part of his maintenance control plan. This shall consist of a log and record book which shall be utilised to log and record all operations, faults, system checks, breakdowns, maintenance visits, inspections, etc.

The logbook shall be kept in a safe place at the maintenance section and shall only be utilised by the boiler house supervisor, the Contractor and the Engineer. A copy of the monthly entries and recordings into this logbook shall be submitted by the Contractor together with this monthly report to the Engineer.

The logbook shall be structured to include at least the following:

- (i) Daily inspection and maintenance actions;
- (ii) Monthly inspection and maintenance actions;
- (iii) Six-monthly inspection and maintenance actions;
- (iv) Breakdown reports;
- (v) Statutory inspection and test comments and reports.

The Contractor shall also institute an attendance register, which shall be kept in a safe place at the maintenance section. This register shall be completed by all persons visiting the relevant plants, including:

- (a) Contractor and maintenance personnel;
- (b) Inspectors;
- (c) User Client and associates;
- (d) Engineer.

This register shall state the date, time-in, time-out, name, company and reason for visit. A copy of the register shall be submitted by the Contractor together with his monthly report.

On completion of repair work and/or the installation of new equipment the plant and equipment shall be put into operation after all tests and adjustments have been carried out to the satisfaction of the Engineer. Where new plant is installed the Contractor shall run and operate the system for a period of time specified by the Engineer and train the staff of the User Client to operate and maintain the system.

Logging of the operation of the installations shall commence immediately upon start-up.

The Contractor shall submit a full commissioning report as per attached commissioning data sheet.

FD 07

TESTS AND INSPECTIONS ON COMPLETION OF REPAIR WORK

On completion of repair work the Contractor shall prior to recommissioning test the plant and its equipment.

Except where otherwise provided in the Contract, the Contractor shall provide labour, materials, power, fuel, accessories and properly calibrated and certified instruments necessary for carrying out such tests. Arrangements for these tests shall be made by the Contractor and he shall give at least 72 hours written notice to the Engineer before commencing the test.

In the event of the plant or installation not passing the test, the Employer shall be at liberty to deduct from the Contract amount all reasonable expenses incurred by the Employer or the Engineer attending the repeated test.

Whenever any installation or equipment is to be operated for testing or adjusting as provided for above, the Contractor shall operate the entire system for as long a period as may be required to prove satisfactory performance at all times in the occupied space served by that system for up to twenty-four hours a day continuously until the certificate of practical completion of repair work is handed over.

The Contractor shall provide all labour and supervision required for such operation and the Department may assign staff as observers, but such observation time shall not be counted as instruction time.

After complete installation of the system all equipment shall be tested, adjusted and readjusted until it operates to the satisfaction and approval of the Engineer.

The Contractor shall submit certificates of tests carried out to prove the performance of all equipment, as well as certificates obtained from all the relevant authorities and statutory bodies, etc.

The Contractor shall only utilise departmentally approved inspection authorities for all inspections and tests to be conducted. This will be done and approved in writing among the relevant parties.

FD 08 **QUALITY ASSURANCE SYSTEM**

The Contractor shall institute an approved quality assurance (QA) system, which shall be submitted to the Engineer for his approval. The records of this QA system shall be kept throughout the duration of the Contract and be submitted to the Engineer at regular intervals as required.

FD 09 **COMMISSIONING AND RECOMMISSIONING OF PLANT AND INSTALLATION**

FD 09.01 **GENERAL**

On completion of repair work and/or the installation of new equipment the plant and equipment shall be put into operation after all tests and adjustments have been carried out to the satisfaction of the Engineer. Where new plant is installed the Contractor shall run and operate the system for a period of time as specified by the Engineer and train the staff of the User Client to operate and maintain the system. Logging of the operation of the installations shall commence immediately upon start-up.

The Contractor shall submit a full commissioning report as per attached commissioning data sheet.

FD 09.02 **RECOMMISSIONING OF PLANT AND ANCILLARY EQUIPMENT**

On completion of repair work the Contractor shall recommission the plant and its equipment. This operation shall also be carried out strictly in accordance with the manufacturer's specification and shall be witnessed by the Engineer.

Recommissioning checks to be carried out shall be categorised under the following headings:

- (a) Mechanical checks
- (b) Electrical and control checks.

On completion of repair work the Contractor shall recommission the plant and its ancillary equipment. This operation shall be done strictly in accordance with the manufacturer's specification and shall be witnessed by the Engineer. This shall include but not be limited to the following:

- (a) All required recommissioning mechanical checks



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

- (i) Check system for leaks;
- (ii) Check rotation of all fans;
- (iii) Check mountings of all equipment.

- (b) All required recommissioning electrical and control checks
 - (i) Check all wiring connections for tightness and repair any hot connections.
 - (ii) Check that all electrical equipment have been properly reconnected in accordance with the manufacturer's specification.
 - (iii) Perform and record all required electrical insulation tests on equipment.
 - (iv) Check and test all controls with main circuits isolated.
 - (v) Check all motor-driven equipment for correct rotational directions.
 - (vi) Check and test the operation of all indication and warning lights.
 - (vii) Check, set, record and readjust all equipment control and set points in accordance with manufacturer's specification.
 - (viii) Run all motor-driven equipment for a period to ensure free movement and correct operation. Feed pumps only to be operated for a short interval to check rotation.

FD 09.03 COMMISSIONING AND COMPLETION OF REPAIRS

On completion of the recommissioning checks the Contractor shall proceed with the commissioning. This operation shall also be carried out in accordance with the manufacturer's specification and shall include but not be limited to the following for the different types of equipment:

FD 09.03.01 Self-contained air-conditioning unit

- (a) Check evaporator and condenser pressures and superheat.
- (b) If the unit needs charging, find leak, decant, repair leak and recharge unit.
- (c) Check fans, fan speed control and fan motors.
- (d) Check entering and leaving air temperatures over evaporator coil.
- (e) Check operation of all safeties:
 - (i) LP cut-out pressure
 - (ii) HP cut-out pressure
 - (iii) Low on-coil thermostat
 - (iv) Set point of oil pressure safety
 - (v) Oil pressure trip.
- (f) Check anti-recycle timer.

- (g) Check all running amps of fans and compressors.
- (h) Check compressor unloading mechanism if applicable.
- (i) Complete commissioning data sheet.

FD 09.03.02 Ventilation system

- (a) Check fans, fan speed control and fan motors.
- (b) Check running amps of fans.
- (c) Check pressure drop over filters.
- (d) Check air quantity over filters or canopy face velocity.
- (e) Check outlet air quantities.

The Contractor shall visit, inspect, test and readjust the plant during the 30-day period following the recommissioning to ensure the correct functioning of the plant and its associated equipment.

FD 10 GUARANTEE OF INSTALLATION AND EQUIPMENT

The Contractor shall provide and obtain guarantees from the manufacturer(s) and/or supplier(s) to the effect that each piece of new equipment supplied and installed under the repair contract, will comply with the required performance and will function as part of the complete system.

All new equipment, including the complete new installations and the systems as a whole, shall be guaranteed for a period of 12 (twelve) months commencing on the day of issue of a certificate of completion for repair work of the installation.

FD 11 MAINTENANCE TOOLS AND SPARES

Each maintenance workshop shall be equipped with the necessary maintenance tools and spares as required by the specific type of plants and installation for the daily operation and maintenance of the plant. At the start of the repair and maintenance contract the Contractor shall make an inventory of the existing tools and spares in the presence of the User Client, and any shortfall or damaged tools and spares shall be replaced with new. All replacement tools and spares shall be as specified by the boiler and equipment manufacturers. These tools and spares shall be kept in a lockable room or cabinet of which the maintenance supervisor and the Contractor shall carry keys. The Contractor shall on a monthly basis take stock of these items in the presence of the

maintenance supervisor and shall record and report to the Engineer. Any shortfall shall be replaced by the Contractor as part of his responsibility under this Contract.

The tools and spares to be carried shall include, but not be limited to at least the following:

(a) Tools

- (i) Electric welding (arc welder)
- (ii) Oxy-acetylene welding set
- (iii) Soldering iron
- (iv) Pipe cutter
- (v) Swaging tool set
- (vi) Flaring tool set
- (vi) Leak detector (electronic or leak torch or Spectro light)
- (vii) Vacuum pump
- (viii) Service valve ratchet
- (ix) Refrigerant reclaim unit
- (x) Flow measuring hood
- (xi) Pitot tube
- (xii) Vacuum gauge
- (xiii) Digital thermo anemometer
- (xiv) Hygrometer
- (xv) Tung tester
- (xvi) Coil comb
- (xvii) Multimeter
- (xviii) Amp meter
- (xix) Combination spanner set
- (xx) Combination socket set
- (xxi) Allen keys
- (xxii) Screwdriver set
- (xxiii) Drill set
- (xxiv) Drilling (arc welder)
- (xxv) Pop rivet gun
- (xxvi) Tab and die set
- (xxvii) Three-jaw gear pulley
- (xxviii) Hacksaw
- (xxix) Level
- (xxx) Bench vice
- (xxxi) Assorted files
- (xxxii) Tape 5 m
- (xxxiv) Torch.

(b) Spares

It is recommended that essential parts be maintained in inventory. Essential parts are those parts used frequently in responding to routine and urgent work requests. Consider the accessibility to spares and the time it takes to obtain them. The goal is to avoid stockpiling parts, as well as to avoid being without a needed part. The following parts are regarded as essential spares:

- (i) Schreuder valves
- (ii) Relevant refrigerants
- (iii) Relevant refrigeration compressor oil
- (iv) Filter/dryers
- (v) Expansion valves
- (vi) Filter sets
- (vii) Relevant V-belts
- (viii) Lubricants and greases.

FD 12 **REPAIR WORK TO INSTALLATION SYSTEMS AND EQUIPMENT**

FD 12.01 **GENERAL**

At the start of the repair and maintenance contract all the systems, installations and equipment shall be repaired as specified in the Particular Specification. This repair work shall include but not be limited to the specified Particular Specification details.

All repair work shall be executed using approved materials and equipment suitable to the systems and/or installations they serve. The said repair work shall be executed in accordance with the relevant codes of practice, standard, regulations, municipal laws and by-laws, manufacturer's specifications and codes of practice and all additional and particular specifications included in this document.

The repair work items shall be listed in tabular form in the Particular Specification with all relevant details, such as capacity, size, manufacturer, model number, etc.

All repair work shall be executed within the approved period for repairs to be agreed at the start of the Contract period. All new equipment, materials and systems shall be furnished with a written guarantee of a defects liability period of 12 months from date of issue of a certificate for completion of the repair work. These guarantees shall be furnished in favour of the Department of Public Works. On completion of the required and specified repair work the systems, installations and equipment shall be commissioned and handed over to the satisfaction of the Engineer.

Repair work items shall be categorised for the following installations:

- (a) Ventilation systems including canopies
- (b) Self-contained air-conditioning units.

FD 12.02 VENTILATION SYSTEMS

- (a) Replace fresh air intake screen.
- (b) Inspect and clean all duct work and canopy.
- (c) De-rust, neutralise and touch up paint work on ducting and canopy.
- (d) Check tightness of all securing bolts.
- (e) Replace all canvas collars with new.
- (f) Replace all filters.
- (g) Check bearings of fan motors and lubricate.
- (h) Check whether all duct supports are still in position and replace missing supports.
- (i) Check duct work for leaks and repair defects.
- (j) Replace all joint seal and gaskets with new.
- (k) Check all fire dampers for correct operation and reset.
- (l) Clean fan blades and check for unbalance.
- (m) Check fans, speed control and fan motor.
- (n) Check running amps of fan.
- (o) Reseal penetrations through roof.

FD 12.03 SELF-CONTAINED AIR-CONDITIONING UNITS

- (a) Clean air intake screen.
- (b) Replace filters.
- (c) De-rust, neutralise and touch up paintwork.
- (d) Replace canvas collars.
- (e) Clean housing, ensure all panels are properly secured and door panels close properly.
- (f) Check setting and operation of all pressure switches, reset if required.
- (g) Check setting and operation of all safety switches, i.e. LP and HP switches, oil pressure switch.
- (h) Check setting and operation of thermostats.
- (i) Check timers and reset if required.
- (j) Check operation of seven-day timer.
- (k) Check running current of fans and compressor and settings and operation of overloads.
- (l) Check tightness of all electrical terminals.
- (m) Ensure operation of local and remote isolators.
- (n) Check condition of all cables and whether cables are neatly strapped and reposition and strap if required.
- (o) Ensure correct operation of emergency stop.
- (p) Carry out a leak test on all refrigeration piping and components inclusive of evaporator and condenser.
- (q) All leaks shall be repaired. Should a leak on a component be of such a nature that it cannot be repaired, the component shall be replaced. The procedure to follow is as set out in FD 03.
- (r) The superheat setting of the thermostatic expansion valve shall be checked and adjusted if required (setting approximately 8 °C).

- (s) The filter dryer shall be replaced.
- (t) Check compressor vibration mounts.
- (u) Test oil acidity.
- (v) Check refrigerant charge sight glass being clear or flashing.
- (w) Check moisture indication being dry.
- (x) Clean condensate tray and test drainage operation.
- (y) Clean evaporator and condenser blades and check unbalance.
- (z) Replace suction line insulation.
- (aa) Check all service valves for full operation, replace caps if missing.

FD 13 **MAINTENANCE TO INSTALATION AND EQUIPMENT**

FD 13.01 **GENERAL**

Monthly maintenance responsibilities for each installation including all units and components as specified, shall commence with commencement of the Contract. A difference shall be made in payment for the maintenance prior to and after practical completion of repair work.

Maintenance responsibilities of the completed installation shall commence upon the issue of a certificate of practical completion for repair work, and shall continue for the remainder of the 36-month contract period.

This part of the Contract shall include:

- (a) Routine preventative maintenance;
- (b) Corrective maintenance; and
- (c) Breakdown maintenance,

The said maintenance work shall be executed in accordance with the relevant codes of practice, statutory regulations, standards, regulations, municipal laws and by-laws and the manufacturers' specifications and codes of practice.

The maintenance schedules and frequency shall be developed under the maintenance control plan to be instituted by the Contractor.

All new equipment, components and materials supplied and installed under the maintenance contract shall be furnished with prescribed manufacturer's guarantees.

The maintenance work and items are to be categorised by the Contractor for each maintenance activity under the following headings:



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

- (a) Ventilation systems
- (b) Self-contained air-conditioning units.

The Contractor shall be remunerated monthly, based on his performance, for maintaining the complete installation in a perfect functional condition.

FD 13.02 **DEFINITION AND QUALIFICATION OF ACTIONS**

FD 13.02.01 **Daily maintenance actions**

Daily actions are the responsibility of the User Client. These checks are to be performed by staff responsible of the facility. The self-contained air-conditioning units and ventilation systems should run during working hours and/or continuously. The status of these systems can thus be monitored by observation on a daily routine.

(a) **Ventilation systems:**

- Are the systems running and is the operation quiet?
- Is the kitchen hood removing vapour from the kitchen?

(b) **Self-contained air-conditioning units:**

- Does the unit perform and maintain temperature?
- Is the temperature in the areas concerned satisfactory?
- Is the condensate drain working properly?

These daily checks shall be logged at the facility, ie by the kitchen manager and the maintenance personnel.

FD 13.02.02 **Monthly maintenance actions**

TABLE FD 13.02.02/1: VENTILATION SYSTEMS

REFERENCE NUMBER	ACTION
V-1	Inspect air intake for blockages
V-2	Check all accessible duct work for leakages, damages, and damages supports
V-3	Clean filters
V-4	Check electric motor running temperature
V-5	Check electric connections for tightness
V-6	Check operation of relief air grilles and check that they are not blocked
V-7	Check for motor noise and check bearings
V-8	Check for leaks on canvas collars

TABLE FD 13.02.02/2: SELF-CONTAINED AIR-CONDITIONING UNIT

REFERENCE NUMBER	ACTION
S-1	Clean filters, replace if required
S-2	Inspect air intake and discharge for blockages
S-3	Check all refrigerant, drainage pipes for damaged and leaks
S-4	Check sightglass: clear or flash gas
S-5	Carry out visual inspection of condenser coil for blockages and correct operation of fans
S-6	Carry out visual inspection of evaporator coil for blockages and correct operation of supply fan
S-7	Check enclosure for damages
S-8	Check electric motor running temperatures
S-9	Check electric connections for tightness
S-10	Test thermostat and control operation
S-11	Clean condensate tray and test drainage for proper operation
S-12	Check cooling and heating cycle

Note: The monthly actions shall include the activities of the daily maintenance actions.

FD 13.02.03 Biannual maintenance actions

TABLE FD 13.02.03/1: VENTILATION SYSTEMS

REFERENCE NUMBER	ACTION
V-1	Inspect air intake for blockages
V-2	Check all accessible duct work for leakages, damages, and damages supports
V-3	Clean filters
V-4	Check electric motor running temperature
V-5	Check electric connections for tightness
V-6	Check operation of relief air grilles and check that they are not blocked
V-7	Check for motor noise and check bearings
V-8	Check for leaks on canvas collars

V-9	Clean fan blades and check for unbalance
V-10	Clean exterior casing
V-11	Clean all grilles
V-12	De-rust, neutralise and touch up paint work
V-13	Check vibration mounts of fan and tightness of mounting bolts

TABLE FD 13.02.03/2: SELF-CONTAINED AIR-CONDITIONING UNITS

REFERENCE NUMBER	ACTION
S-1	Clean filters, replace if required
S-2	Inspect air intake and discharge for blockages
S-3	Check all refrigerant, drainage pipes for damages and leaks
S-4	Check sight-glass: clear or flash gas
S-5	Carry out visual inspection of condenser coil for blockages and correct operation of fans
S-6	Carry out visual inspection of evaporator coil for blockages and correct operation of supply fan
S-7	Check enclosure for damages
S-8	Check electric motor running temperatures
S-9	Check electric connections for tightness
S-10	Test thermostat and control operation
S-11	Clean condensate tray and test drainage for proper operation
S-12	Check filter/dryer
S-13	Check superheat and functioning of expansion valve
S-14	Check operation of HP and LP switch
S-15	Check operation of controllers
S-16	De-rust, neutralise and touch up paint work
S-17	Check cooling and heating cycle
S-18	Clean evaporator and condenser coil chemically
S-19	Clean all filter frames and seals
S-20	Check fan motor and compressor current
S-21	Check and test overload settings
S-22	Lubricate all bearings

Note: The above biannual actions include the activities of the monthly maintenance actions.

HVAC COMMISSIONING DATA SHEET - AIR CONDITIONING UNITS

INSTALLATION:		
A/C MAKE :		
Model number	: Inside unit	
	: Outside unit	
Serial number	: Inside unit	
	: Outside unit	
Voltage	:	
Starting amps	:	
Running amps	:	
	COOLING	HEATING
System discharge gauge pressure: (kPa and running)		
System suction gauge pressure: (kPa and running)		
Condenser : cooling medium inlet temperature:		
Condenser : cooling medium outlet temperature:		
Evaporator : air inlet temperature:		
Evaporator : air outlet temperature:		
Room dry bulb temperature after 1 hour A/C operation:		
Ambient dry bulb temperature:		

COMMISSIONED BY:

CONSULTANT:

.....
PRINT

.....
SIGNATURE

.....
PRINT

.....
SIGNATURE

.....
DATE

.....
DATE



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE



**NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF
POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE**

POLOKWANE

PASSENGER LIFT SPECIFICATION

MECHANICAL ENGINEERS



MAKONE CONSULTING ENGINEERS

Tel: 011 704 0253

Fax: 011 704 0037

Email: nkololo@makone.co.za

Website: www.makone.co.za



SECTION 1 – GENERAL

1. Intent of Specification

The lift specification is intended to cover the complete installation of the lift plant. In all cases where a device or part of the equipment is referred to in the singular, it is intended that such reference shall apply to as many devices as are required to complete the installation.

2. Standards and Codes

All work shall be in accordance with the requirements of the SANS 1545-1; SANS1545-2; SANS1545-5; SANS1545-10; SANS1543; “Specifications for Lifts, Escalators and Passenger Conveyors” and shall comply with the Occupational Health and Safety Act 85 of 1993 and current regulations of all other codes applicable to this work.

Equipment and materials shall be new and manufactured in accordance with EN-81 standards and approved by the local authorities having the appropriate jurisdiction.

All equipment shall be provided by the same manufacturer.

3. Compliance with Regulations

The installation shall be erected and tested in accordance with the following Acts and regulations:

- a) The latest issue of SANS 10142: “Code of Practice for the Wiring of Premises”,
- b) The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended,
- c) The Local Government Ordinance 1939 (Ordinance 17 of 1939) as amended and the municipal by-laws and any special requirements of the local supply authority,
- d) The Fire Brigade services Act 1993 Act 99 of 1987 as amended,
- e) The National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as amended,
- f) The Post Office Act 1958 (Act 44 of 1958) as amended,
- g) The Electricity Act 1984 (Act 41 of 1984) as amended and
- h) The Regulations of the local Gas Board where applicable.

4. Scope of Work

4.1 Work included

Provide all labour, materials, equipment and services and perform all operations required for lift work as indicated on drawings or specified herein.

Supply and installation of all fixing materials for installation of equipment in the lift shaft.

Supply and installation of the necessary wiring in conduit from the controlling circuit breaker to the power section of the lift controller.

Supply and install conduit and wiring for the car lighting and socket outlets and the termination and connection thereof in the distribution board.

The lift shaft shall be provided with permanently installed electric lighting, which shall be switched from the pit. The highest and lowest luminaires shall be mounted not more than



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

500mm from the top of the shaft and from the bottom of the pit respectively, with intermediate luminaires mounted at intervals not exceeding 7000mm. The minimum illumination at 1000mm above the car roof and the lift pit shall be 50lux.

The installation of all electrical equipment shall comply with the requirements of the SANS 10142 and a Certificate of Compliance shall be issued therefor.

4.2 Work Executed by Other Trades

Structural

Lift shafts complete with all access doors and openings as per drawings.

Concrete slabs with up-stands constructed for the lift machine foundations at the top of each lift shaft.

Waterproofing of lift pit after setting of all pit supporting steels and rail inserts. Pit drains or auto draining pumps as required.

Electrical

Provision of a 3-phase, 4-wire, 50Hz 400/231V permanent power supply to a surface mounted distribution board for each lift. The distribution board will also be equipped with a separate circuit breaker for the shaft and car lighting as well as a separate circuit breaker with earth leakage protection for the socket outlet in the pit and on top of the lift car.

The normal/standby power indicating circuitry shall include, a delayed normally closed potential free contact at 220 Volts/5 Ampere of the emergency power change over switch gear shall be wired to the lift machine room/s and shall be terminated in a suitable junction box. All wire ways or 25mm minimum conduit required to inter-link the lift motor room for the sequencing of lifts in multi-group installations shall be included under this section.

5. Co-ordinating

Due to the nature of the installation, a fixed sequence of operation is required to properly install the complete lift system. The work shall be closely scheduled in order not to delay the entire project.

The Lift Contractor shall familiarise himself with the requirements of the other trades and shall examine the plans and specifications covering each of these sections.

The lift space requirements shall be carefully checked with other trades to ensure that the equipment can be installed in the proper sequence in the space allotted.

6. Submittals

Layout and Shop Drawings

Shop drawings are required for car enclosure, landing entrances and signal fixture work showing construction, finish and fastening details. Furthermore, shop drawings shall clearly show the motor room construction detail, shaft construction detail including all the required internal supporting beams, pit dividing walls for multi-lift shafts and pit sump pump drains. Composite shop drawings shall be submitted for areas, which require close co-ordination with the work of the different trades.



All special equipment and fixture faceplates shall be submitted for approval. Drawings and samples or brochures shall be submitted for each type of fixture and shall be co-ordinated with the architectural drawings. Final design and material proposed for fixture faceplates and special equipment shall be approved by the Representative/Agent.

Samples

All exposed materials and finishes shall be submitted to the engineer for approval in sample form.

The Lift Contractor shall furnish such samples as may be called for and the engineer may reject all materials or workmanship not corresponding with the samples. All approved samples shall be held in safe-keeping until such time as the work to which they apply has been completed.

7. Tests Certificates and Inspections

The Lift Contractor shall carry out all the tests and checks required in terms of the document SANS1545-10 Annex A and/or B and issue the necessary Certificate of Compliance prior to final completion

Upon completion of the installation of all equipment and once being in full operation the Lift Contractor shall completely test the lift equipment to demonstrate that the equipment is provided in compliance with the specification. The total costs for these test shall be included in the tendered amount.

The Lift Contractor shall make arrangements for such tests and shall give at least 72 hours written notice to the engineer, before commencing the test.

In the event of the plant, equipment or installation not passing the test, the engineer shall be at liberty to deduct from the Contract amount all reasonable expenses incurred by the client DPW

Whenever any installation or equipment is operated for testing or adjusting as provided for above, the Contractor shall operate the entire system for as long a period as may be required to prove satisfactory performance at all times in the occupied space served by that system until the system is handed over.

The Contractor shall provide all labour and supervision required for such operation and the Department may assign operating personnel as observers, but such observation time shall not be counted as instruction time.

After completing the installation or system, all equipment shall be tested, adjusted and readjusted until they operate to the satisfaction and approval of the Representative/ Agent.

The Contractor shall submit certificates of tests carried out to prove the efficiency of all equipment, as well as certificates to be obtained from all relevant authorities, statutory bodies, etc.

8. Application to Department of Labour

The Lift Contractor shall submit all the necessary drawings and information to the Regional Director of the Department of Labour and shall submit the necessary application for the erection and use of the lifts, access goods lifts only and escalators.

9. Operating and Maintenance Manuals

The Contractor shall be responsible for the compilation of a complete set of Operating and Maintenance manuals.

This shall be done in accordance with the Additional Specification – Operating and Maintenance manuals.

All information shall be recorded and reproduced in electronic format as well as supplying the Representative/Agent with three sets of hard copies.

Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion of the installation.

10. Guarantee

After first delivery of the installation, there will follow a 12-month free maintenance period.

During this period the lift contractor shall maintain the lift installation as per the requirements of the Occupational Health and Safety Act. This maintenance shall include systematic examinations, adjustments and lubrication of all lift equipment. Electrical and mechanical parts shall be repaired or replaced whenever it is required to maintain optimum performance without additional cost to the Department, unless the condition was caused by misuse or vandalism of the lift equipment or due to acts of God.

The work under this section shall be performed by competent, qualified personnel under the supervision and in the direct employment of the Lift Contractor and shall not be transferred to any non-affiliated agent. Contract maintenance and repair work shall be done during normal working hours and shall further provide emergency call-back service twenty-four (24) hours a day, seven (7) days a week.

During the guarantee period the Department will invite tenders for the comprehensive maintenance of the lift installation, which will commence after the final delivery has taken place, i.e. after the twelfth month guarantee period is over and all defects are corrected.

11. Materials and Workmanship

- (a) The work throughout shall be executed to the highest standards and to the entire satisfaction of the engineer who shall interpret the meaning of the Contract Document and shall have the authority to reject any work and materials, which, in his judgement, are not in full accordance therewith. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Representative/Agent.
- (b) All work shall be executed in a first-class manner by qualified tradesman.
- (c) The Contractor shall be fully responsible for his work and shall replace any of the work which may be damaged, lost or stolen. The Contractor shall protect the building and its contents against damage by him, his employees or sub-contractors and shall make good any damage thereto.
- (d) The Contractor shall indemnify the Employer of all liability for damages arising from injuries or disabilities to persons or damage to property occasioned by any act or omission of the Contractor or any of his sub-contractors, including any and all expenses, legal or otherwise, which may be incurred by the Employer or Representative/Agent in the defence of any claim, action or suit.

- (e) The Contractor shall warrant that the materials and workmanship shall be of the highest grade, that the equipment shall be installed in a practical and first-class manner in accordance with the best practices and ready and complete for full operation. It is specifically intended that all material or labour which is usually provided as part of such equipment as is called for and which is necessary for its proper completion and operation shall be provided without additional cost whether or not shown or described in the Contract Document.
- (f) The Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation work. The Contractor shall also be prepared to promptly furnish any information relating to his own work as may be necessary for the proper installation work and shall co-operate with and co-ordinate the work of others as may be applicable.
- (g) The Contractor shall inspect and verify that the existing power feeder system is compatible with the equipment offered and any changes or upgrading of the electrical supply shall be brought to the attention of the Representative/Agent.
- (h) Material and equipment damaged in transit shall be replaced with undamaged material.
- (i) All components and their respective adjustment, which do not form part of the equipment installation work, but influence the optimum and safe operation of the equipment shall be considered to form part of, and shall be included in the Contractor's scope of works.
- (j) All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.
- (k) The Contractor shall make sure that all safety regulations and measures are applied and enforced during the installation and guarantee periods to ensure the safety of the public and the User Client.
- (l) The Contractor is to include for all scaffolding required to complete the work required.

12. Brochures

Detailed brochures of all equipment offered, including the control, drive, door operator, call buttons and signals, remote monitoring station, intercoms and emergency dial-out system shall be presented together with the tender documents.

SECTION 2 – EQUIPMENT REQUIREMENTS

1. Hoisting Machine

1.1 Traction Drive

- (a) The brake shall be spring applied and electrically released by direct current. There shall be two shoes actuated by compression springs. The brake shall have sufficient power to hold the car at any landing with the normal amount of counter balancing and with at least 150% of rated load. The brake shall operate in the event of a power failure or any other safety device designed to stop the lift.
- (b) An effective sound reducing material shall be installed between the bed-plate of an overhead or basement driving machine and the beams, the structural concrete slab, shaft structure or the up-stands.
- (c) The driving machine and motor shall have sufficient capacity to operate the lift continuously at 100% of rated speed in both directions without overheating or hunting during levelling.
- (d) The lift machinery shall operate silently and without vibration. The lifts shall constantly operate and shall be maintained at noise levels not exceeding 56 DB (A). The noise level shall be considered acceptable if it does not exceed 56 DB (A) measured on the landing and in the car enclosure.
- (e) Provision shall be made for a safe method of moving the car by hand in the event of a power failure and all the necessary equipment required to carry out this task shall be mounted neatly in the motor room and shall remain on site at all times.
- (f) The Contractor shall supply and install suitable structural steel beams with bearing plates for the mounting of the lift machine on the motor room floor, as well as supporting beams or deflector and secondary pulleys, as required. In the cases where machines are located below, the diverter sheaves shall be secured to the floor slabs and not to the overhead slabs, to prevent the transmission of vibration to the structure.
- (g) Anti-vibration mountings shall be provided to minimise the transmission of vibrations to the structure and to ensure the silent and smooth operation of all the equipment. Tenderers shall describe the methods to be used to achieve the desired results.

2. Controller

- (a) Programmable solid state operation and motion controller shall be provided to control the operation, the starting, the stopping and the speed of the lift motor and also to apply the brake automatically if any of the safety devices operate or the power fails.
- (b) All solid state controllers shall be enclosed in ventilated sheet metal cabinets with integral blowers. All power resistors and heat generating transformers shall be mounted in separate enclosures if necessary to maintain the specified control panel internal temperature. The control cabinets shall be totally enclosed, vermin and insect proof, drip proof and dust proof to at least class IP42 of IEC 144.

- (c) Contacts breaking heavy currents shall be provided with magnetic blowouts and arc chutes. Contact surfaces shall be of silver-to-silver except those for heavy currents, where carbon-to-silver or carbon-to-copper contact surfaces may be used.
- (d) All terminals of the machinery and control gear shall be marked with distinctive letters or numbers, and corresponding markings shall appear on the contract drawings.
- (e) All controllers shall be generic manufactured, assembled and supplied.
- (f) As a standard, PLC lift controllers shall not be accepted. However, if these controllers are considered a generic product by the Representative/Agent and are able to meet the requirements of the specification, PLC controllers may be offered as an alternative if the following requirements are met:
 - Documentation stating that the control system has been subjected to extensive testing and is verified as safe, reliable and fully complies with SANS 1545 and all national, local regulations and by-laws.
 - If requested by the Representative/Agent, the Contractor shall provide the Representative/Agent with a full set of back up software / software module and all associated maintenance related documentation including principle diagrams.
 - Documentation from the PLC supplier is provided to verify the age of the model used, the date it is expected to be removed from the production line and the period the PLC supplier will guarantee parts and repairs.
 - The Contractor shall verify that the PLC supplier is willing to maintain under a fully comprehensive agreement, the entire PLC unit(s) for at least 20 years.

3. Control System

- (a) The control system shall be capable of constantly producing the performance criteria specified.
- (b) The associated control equipment for each control system shall provide smooth acceleration and deceleration. In conjunction with the controller and machine, the system shall consistently provide the performance times specified.
- (c) The drive control system shall be capable of decelerating the lift to stand still without a "levelling in" or "creeping in" phase. Only lifts with direct floor approach capabilities shall be accepted.
- (d) The motor drive unit shall provide a smooth lift performance including acceleration, steady velocity and deceleration plus levelling to various floors within the time allowance and levelling tolerances specified. This performance shall be consistent under all conditions of loading and in either direction of travel.
- (e) The motor drive unit shall be equipped with all necessary monitoring circuits to maintain a safe and reliable operation. These shall include but are not limited to the monitoring of the load, direction of rotation, speed, supply voltage, and operating currents.
- (f) The hoist motor shall be provided with a thermostatically controlled blower if necessary, to dissipate the heat in order to maintain the equipment within the specified operating temperature range.

- (g) The control system shall provide a smooth acceleration and deceleration with the levelling accuracy at all landings from no load to full rated load in the lift. This smooth operation shall be obtained for all lifts under stable conditions. A maximum of 0.8 seconds shall be allowed from door close to car start.
- (h) The equipment shall be designed to operate at plus or minus 15% of normal feeder voltage and plus or minus 5% of feeder frequency without damage or interruption of lift service.
- (i) The control system shall be designed to operate the hoist motor continuously at 100% of rated speed and at 100% of rated load in both directions without overheating or hunting.

4. Machine Room Indicators / Rope Markers, Monitors and Testing Tools

- (a) Monitor and keyboard or hand held testing instruments for commissioning, re-commissioning and fault analysis of the lift control system shall be provided and shall remain on site at all times. Each group of lifts shall be supplied with its own monitor and keyboard or testing instrument.
- (b) As each lift travels through the lift shaft, a main hoisting rope marker shall indicate its floor level position by means of a mechanical selector attached to the machine control indicator. This indicator shall operate independently to the lift control and shall not be dependent on the lift supply for its operation.
- (c) The lift control system shall be capable of generating error/fault reports. Error logs for each lift showing at least forty (40) of the most recent faults shall be accessible. The error log shall clearly indicate the type of fault, lift number, date and time the fault occurred.

5. Safety Gear and Governor

- (a) An over-speed governor, driven directly by an independent rope attached to the car, shall be provided in the motor room and shall be designed to operate the safety gear fitted to the car when the speed of the car, due to any cause, exceeds its normal maximum speed by more than a predetermined value. The tripping speed of the governor shall be selected with due regard to the rated speed. The tripping speed shall be approximately inversely proportional to the rated speed and shall for rated speeds ranging from 0,25m/s to 5,0m/s not exceed the rated speed by more than 40% and 20% respectively.
- (b) The safety gear shall be arranged to stop the lift whenever excessive descending speed is attained. Means shall be provided to cut off power from the motor and apply the brake prior to application of the safety gear. The safety gear shall be released by moving the lift in the "UP" direction.
- (c) The governor rope system, including the governor and tension sheave, shall be arranged so that the carrier shall not be released due to system dynamics when the lift is subjected to an emergency stop in the "UP" direction.
- (d) Car and counterweight safety gear shall be provided with a switch to cut off the power from the motor and apply the brake, if the safety gear applies without tripping the governor.
- (e) Rope guards and an electrical contact to monitor the rope stretch shall be provided on the governor tension sheaves.

6. Rope Guards

Rope guards shall be used to cover machine sheaves, secondary or deflector sheaves and governor sheaves to cover moving sheaves and ropes. Guards are also required on rope hole openings in the machine room and secondary level floors to prevent objects from falling into the lift shaft. Guards shall be provided in secondary level floors where ropes and tapes or selector drives pass through to prevent accidental contact.

7. Machine Data Submittals

The Contractor shall supply all the relevant machine data to ensure the correct power feeder design, including, but not limited to the following:

- Lift numbers
- Capacity / load kg
- Speed m/s
- Supply Voltage Volts
- Supply Frequency Hertz
- Number of wires
- Motor kW rating kW
- Roping
- Full load UP acceleration Amps
- Full load UP nominal speed Amps
- Machine heat release per car BTU/hr/car
- Power Factor %

8. Lift Shaft Requirements

- (a) In terms of SANS 1545 (Parts 1 and 2) provide the necessary rope or selector tape guards in pit areas and landing door unlocking devices on all landings.
- (b) Provide safe Working Platforms in pits with depths in excess of two (2) metres and if necessary at the top of the shaft to create sheave-room platforms. The working platforms shall comply with SANS 1545 (Parts 1 and 2) safety requirements pertaining to the depth/height and free space of these areas.
- (c) In terms of SANS 1545 (Parts 1 and 2), shaft lights are to be provided and installed by the Contractor.

9. Car and Counterweight Guide Rails

- (a) The guide rails for the car and counterweight shall consist of planed steel tees with milled, tongued and grooved joints. Metal splice plates shall be of a suitable length and fixing brackets for guide rails shall be provided at intervals not exceeding 2,4m. Guide rail fixings shall be located in such positions that when the car is at any landing, the guide shoes on the car will be at a fixing bracket. The bottom end of each guide rail shall be provided with a sole-plate fixed to the pit floor.
- (b) All brackets shall be secured by means of approved expandable concrete anchor bolts of adequate size and length.

10. Hoist and Governor Ropes

- (a) The ends of the hoist ropes shall be properly secured to the car and counterweight cross-head or to the dead-end hitch plates on 2:1 roping, with adjustable rope

shackles having approved sockets. Screw adjustment shall permit equalisation of the tension in all ropes.

- (b) The lift car hoisting rope attachment / hitch shall be suitably vibration isolated to prevent rope noise from being transferred to the car enclosure.
- (c) Governor ropes shall be in accordance with SANS 1545 (Parts 1 and 2) and the steel rope shall be specially designed for lift service. The two ends shall be securely fastened together at the lift and shall be attached to the safety operating mechanism. The governor rope shall pass over the governor sheave and over an approved tensioner sheave in the pit. An electrical contact shall be fitted to the pit sheave and shall stop the lift if the governor rope becomes slack or breaks.

11. Counterweight

- (a) Each lift shall be suitably counterbalanced for smooth and economical operation. Cast iron or steel sub-weights shall be contained in a guided structural steel frame. The counterweight shall be equal to the weight of complete lift car plus at least **40%** of the rated load. The weights in the counterweight frame shall be balanced with the weight equally distributed across the width of the frame to equalise guide pressures. The sub-weights shall be welded or fastened together as necessary to prevent rattling.
- (b) Counterweight screen guards shall be provided at the bottom of the shaft to a height of 2150mm above the floor of the pit and approximately halfway up the shaft at the position where the car and counterweight pass each other.

12. Car and Counterweight Guide Rollers or Shoes

The car and counterweight guide rollers/shoes shall constantly provide the ride quality as specified in Section 3 clause 11 of this specification.

12.1 Guide Rollers

- (a) Each lift shall be provided with car and counterweight rollers guides. Each roller guide shall consist of at least three wheels with a durable resilient material, each rotating on ball bearings having sealed-in lubrication, assembled on a substantial metal base and so mounted as to provide continuous contact of all wheels with the corresponding rail surface under all conditions of loading and operation. The wheels shall run on three machined rail surfaces. The roller guides shall be properly secured at top and bottom on each side of the car frame and counterweight frame.
- (b) The roller guides shall run on dry guide rails. Sheet metal guards shall be provided to protect wheels located on the top of the car and the counterweight. The roller wheels for the car shall not exceed 500-rpm and the roller wheels for the counterweight shall not exceed 1000-rpm at rated speed.

12.2 Guide Shoes

If the speed and load nominated for a specific lift allows the use of guide shoes:

- (a) The lift shall be provided with car and counterweight spring loaded guide shoes. The spring tension shall be adjusted so as to maintain the lift in the centre of the rails and provide continuous contact with the corresponding rail surface under all conditions of loading and operation. The guide shoes shall be lined with a durable resilient material, which shall ensure a quite and smooth ride. When oil buffers are attached to the bottom of the counterweight, additional guide shoes shall be installed on each side of the buffer cylinder frame.

- (b) The guide shoes shall run on lubricated rails. The guide rails shall be lubricated by a permanently mounted lubrication reservoir on top of the car and counterweight.

13. Electrical Compensation

A sufficient extra hoisting kilowatt rating in the hoist motor, machine and motor generator capacity and control equipment may be provided so that effective electrical compensation for the weight of the hoist ropes and travelling cables shall be accomplished as the lift travels through the lift shaft.

14. Compensation Cables

If Section 2 clause 14 (Electrical Compensation), cannot be achieved the following shall apply:

- (a) Compensating trailing cables or compensating chains encased in a synthetic sleeve (whisper flex) shall be provided.
- (b) Compensating cable restraining rings shall be provided in each pit and mounted on both the car and the counterweight buffer supports.
- (c) Compensation shall be fixed to the bottom of the counterweight and car in a position which shall allow the counterweight to remain balanced in the guides and exert equal pressure on each face of the guide at the four guide locating positions.
- (d) The fixing of the compensation to the car shall be accomplished by a vibration isolating compensation hitch.
- (e) Where compensating steel ropes are used for compensation they shall be accompanied by a statically balanced compensation pit sheave and shall be mounted centrally between the guides.

15. Buffers

- (a) Suitable oil, heavy spring or polyurethane buffers shall be provided for the car and counterweight and shall be so adjusted that in the case of over-travel, no parts of the car or counterweight will touch the shaft ceiling and that the retardation of the car does not exceed the limits as laid down in the SANS 1545
- (b) Hydraulic buffers shall be so constructed and shall be installed to allow the fluid level to be checked easily. Easy access to the buffer for testing and maintenance purposes shall be possible without having to remove the counterweight pit screen.
- (c) Energy dissipation type buffers shall have an electrical contact fitted to monitor the stroke (extended position).

16. Pit Switches

Each lift pit shall be provided with watertight pit safety switches accessible from the entrance to the pits without the necessity of entering the pit and shall also be accessible from the pit while standing on the pit floor. The pit switch shall interrupt the power supply and apply the brake to hold each car so as to permit safe access to the pit. The pit switch shall be clearly distinguished from other switches that may be mounted in the pit area and the on/off position shall be clearly marked.

17. Stopping Devices

- (a) Normal terminal stopping devices shall be enclosed in dust-proof enclosures for each lift. These devices, once operated, shall bring the lift automatically to a smooth stop at the terminal landing.
- (b) Final terminal stopping devices shall be positioned at the top and at the bottom of each lift shaft. A fixed cam securely attached to the lift shall operate these final limit switches. These limit switches shall be independent of any other stopping devices and shall positively open without the use of springs to cut off all power from the driving machine motor and brake. It shall prevent the operation of the lift in either direction. They shall be so located that they open at the time the lift or the counterweight engages the buffer.

18. Travelling Cables

- (a) Travelling cables between the lift and the fixed lift shaft wiring shall be flexible and suitably suspended to relieve the strains in the individual conductors. All cables shall contain an approximately equal number of conductors, or shall have equal flexibility.
- (b) Travelling cables shall include two shielded pairs for each lift car to accommodate voice communication.
- (c) The travelling cables shall be positioned in such a manner to eliminate the possibility of interference with the shaft information, selector tape or governor rope and all the necessary travelling cable protection shall be fitted to the shaft wall and shaft trimmers to prevent damage to the outer cover during normal travel.
- (d) The travelling cables shall be neatly and adequately strapped to the side of the car enclosure and all the necessary protection shall be provided where the cables cross over metal extrusions.
- (e) Travelling cables for the counterweight shall comply with the requirements of this section.
- (f) Flat and round trailing cables shall be fixed and shall hang in accordance with the trailing cable manufacturer's requirements.

19. Electrical Wiring and Control Communication

- (a) All low voltage and control communication cables shall be run in separate ducts, conduits and trailing cables.
- (b) Car top terminal boxes of ample size and car top inspection control units shall be provided.

20. Automatic Self Levelling

All lifts shall be provided with both a self levelling and a re-levelling feature that shall automatically bring the lift to the floor landings within a tolerance of 3.0 mm under no load to full rated load conditions without hunting. Self levelling shall, within its zone, be entirely automatic and independent of the operating device and shall correct over-travel and rope stretch. The lift shall be maintained level with the landing, irrespective of load and while loading and unloading.

21. Lift Car Construction and Enclosure

- (a) The lift car shall be an assembly consisting of the sling, the platform and the cabin.
- (b) The sling shall be constructed of rolled steel angle or channel sections bolted or welded together to form a rigid framework, which shall be suitably braced and reinforced to withstand the operation of the safety gear without permanent distortion.
- (c) The car platform shall consist of a 3mm thick mild steel plate or 20mm thick hardwood floor laid on closely spaced steel channel sections welded to a steel frame which in turn shall be laid on rubber pads in a structural steel frame. Load weighing devices shall be incorporated where specified.
- (d) The cabin shall be designed as a fully enclosed car with a flat roof and solid full height panels on the sides and the back.
- (e) The cabin shall be securely fixed to its sling and platform in such a manner that the cabin is not subjected to strain in the event of an unequal distribution of load occurring over the floor area.
- (f) The entire car assembly, including the car frame and the car platform shall be constructed to operate free from objectionable squeaks or metallic sounds, comprising of a rigidly tuned resonance car frame and acoustically treated superstructure.
- (g) The following features shall also be embodied in the lift car:
 - A continuous lighting system shall be provided along each side of the car. The lighting system shall consist of concealed, surface mounted, standard 2-lamp open fluorescent luminaires, providing an illumination level of not less than 200 lux at 1000mm above floor level. Fluorescent tubes shall be 1500mm, 58 Watt or 1200mm, 36 Watt, colour "Warm White". Tubes and control gear shall be of the switch start type and shall bear the SANS mark. The width of the lighting troughs shall be the same as the front return panels and shall be covered by easily removable low brightness diffusers, mounted in purpose made hinged frames.
 - One of the lamps in each trough shall be provided with an emergency battery/inverter unit by means of which the lamp will be operated for at least 60 min. in the event of a power failure. This lamp shall operate at full output under normal conditions.
 - Luminous car position indicator and "Up/Down" travel indicators installed above the entrance doors.
 - Fixing clips for the attachment of canvas protective coverings which shall be supplied with the lift for the side and rear walls.
 - Silent running squirrel cage, centrifugal flow exhaust blowers for passenger and goods/passenger lifts shall be mounted to draw air into car enclosure when doors are open and through door side clearances when doors are closed. The blower shall be mounted on the car top, draw air from the car through the perimeter of the suspended ceiling and exhaust the air into the lift shaft. **The fan shall without exception, be capable of delivering not less than 0.3 cubic meters of free air per minute per square meter of floor area.** The fan shall be switched via a toggle switch mounted in the car operating panel.

22. Lift Car Finishes

22.1 Passenger & Goods/Passenger Lift

- (a) The entire car internal finish including the area above the suspended ceiling shall be installed and finished off to the highest standard. All finished work shall be smooth and free from wraps, buckles, squeaks and rattles and all joints shall be light-proof.
- (b) All wall panelling shall be jointed with a pliable material /silicone to prevent squeaks generated by car panel movement / deflection.
- (c) A robust handrail, consisting of an "Intrad" poly-carbonate bumper rail, spaced 50mm off the panelling, must be provided across the rear and side walls of the lift car. The spacer blocks to which the hand and bumper rails are secured shall be fixed to the panels by means of 2 x M10 bolts with locknuts or other approved method.
- (d) A silvered glass mirror shall be provided at the rear of the cabin in the side walls between the hand rail and the ceiling.
- (e) Goods/Passenger lift car panels shall be manufactured from at least 1.5mm mild or stainless steel with at least two horizontal intermediate stiffening ribs and panels with a width greater than 400mm shall have vertical stiffening ribs at intervals not exceeding 200mm or equivalent construction.

23. Fixture Faceplates and Mounting

- (a) Unless otherwise specified, all landing fixture faceplates shall be surface mounted and shall be manufactured of at least 3.0 mm thickness stainless steel, with bevelled edges for all lifts if square rectangle stainless steel face plates are offered. However, Contractors may offer alternative landing fixture face plates if these faceplates are generic products and aesthetically acceptable to the Engineer.
- (b) The fixture faceplates in the lift car and at the landings shall be mounted with concealed security fastenings or fastenings requiring special tools to remove them, as approved by the engineer. Exposed fastenings shall match the material and finish of the faceplate.
- (c) The following fixture face plates shall be located and sized in accordance with dimensions approved by the engineer:
 - Car operating panels.
 - Car position indicators.
 - Car direction indicators.
 - Landing push button stations.
 - Landing position indicators and signals.
 - Blanking-off plates
- (d) Without exception the Representative/Agent shall approve the final design of the fixture faceplates before placing the order or manufacturing of this equipment.

24. Car and Landing Door Operator

- (a) Only door operators with the capabilities of coping with medium to heavy traffic shall be accepted and the type of door operator offered shall be clearly shown in the tender submitted. The door system shall be capable of controlling the position

of the doors at any given moment and shall constantly produce a smooth, accurate and efficient operation.

- (b) The doors on the lift car and at each landing opening shall be opened and closed quietly and smoothly by an electric operator.
- (c) The motion of the door operator shall be accomplished with arms and appropriate linkages to the approximate centre of gravity of the driven door panel.
- (d) Each landing door shall be equipped with Electro-mechanical interlocks so that the lift can operate only when the interlock circuit is established. Landing door locks shall meet the SANS 1545-1 safety requirements. All work and material related to this Sub-Section shall form part of the Contractor's scope of works.
- (e) An independent auxiliary self-closing device shall close each landing door panel whenever the door is not in the closed position and the equipment relating to the car and landing door system does not restrain it.
- (f) An electric contact for the lift car door shall be provided which shall prevent the lift moving away from a landing unless the door is in the closed position.
- (g) An electrical contact shall be fitted to the non-driving car door if its linkage is dependent on a wire rope or chain.
- (h) Emergency Triangle access key mechanisms shall be provided on each entrance.

25. Lift Door Hangers

Hangers shall be equipped with ball bearing adjustable rollers to take the up-thrust of the doors. The hangers and rollers shall be designed to accommodate the size and weight of the doors operated with a high speed door operator.

26. Car Door Control

27.1 Car Door Motion Controllers

- (a) Car door motion controllers dependent on resistors, rheostats or switches to control the opening and closing motion shall not be accepted. The car door motion controller shall be capable of controlling the position of the doors at any given moment and shall constantly produce a smooth, accurate and efficient operation.
- (b) **(For Group controls only)** Adjustable hardware or software timers shall be provided to hold the doors open for the dwell times specified below. The tabulated dwell times are initial adjustment standards. Further adjustment to suit specific traffic movement capabilities and the arrangement of car and landing stations shall also be possible. The first passenger dwell times are those measured from door fully open to door start-to-close. The second and succeeding dwell times are from restoration of the light beam to door start to close from its fully reopened position.

Passenger Conditions	Stops for Car Call	Stops for Landing Call
First Passenger	2.0 sec.	3.0 sec.
Succeeding Passengers	1.0 sec.	1.0 sec.

Stops at the high or low car call reversal floors shall be considered as landing call stops.

- (c) If doors are held open for an adjustable period of time by a passenger standing in the entrance or by constant pressure of the door open button, a buzzer shall sound and the doors shall start to close at a reduced speed and force level. When the doors touch an obstruction, they shall re-open.

27.2 Door protection devices

- (a) A non-retractable electronic infra-red/ultra-sonic protective leading edge shall be provided and shall extend at least 2100-mm above the platform and its active surface/area shall project beyond the front edges of each leading car door panel. Should this device come in close proximity, or touch a person or object whilst the car doors are closing, the car and shaft doors shall return to their open position. Manual reversal of the doors while the lift is on automatic operation shall be accomplished by pressing a door open button in a car-operating panel. Should this device be activated while the car doors are closing, the car and shaft doors shall return to their open position.
- (b) Without exception the Contractor shall demonstrate on the day of Completion that the door closing pressures comply in full with the SANS 1545 Part 1 and Part 2 under normal and forced closing conditions.
- (c) The door protection device shall have the capabilities of detecting metal/plastic trolleys.

27. Car Platform

The car platform with enclosure of each lift shall be balanced by arranging balancing weights to equalise the guide pressure (front to back and side to side) so that the pressure on any guide shoe roller does not exceed 18kg without load in the car. (Statically balanced).

28. Landing Entrances

- (a) Each lift shaft landing entrance assembly shall consist of unit frame, door panels, fascia, sill, hanger, closer and interlock. The installation shall comply with the applicable code requirements.
- (b) As a standard all lift landing equipment including doors, signal faceplates shall have a two (2) hour fire rating. The Contractor shall provide the relevant SABS test certificates for Class "C" type landing door equipment.

29. Door Panels

- (a) The door panels for all openings shall be constructed of at least 1.5 mm thick mild or stainless steel. Continuous stiffener channels must be provided to the top, bottom and edges at the faceplates. The bottom of each door panel shall be provided with removable laminated phenolic guides, which run in the sill slots.
- (b) Door panels shall be constructed to operate free from squeaks or metallic sounds and shall be adequately treated with a sound deadening material to produce a quiet door operation under all operating conditions.
- (c) The leading edge of the car and landing doors shall have an interlocking profile with rubber stoppers (top and bottom) to prevent the door panels closing metal to metal. Add on rubber profiles shall not be accepted.
- (d) All landing door site guards shall have a stainless steel box type construction for added rigidity.

(e) Goods/Passenger Lift and Access, Goods Only Lift Car Doors

- (i) Car and landing sills shall have additional angle iron supports (reinforced sills) to accommodate the applicable point loads.
- (ii) Landing and car door panels shall have reinforced sliding shoe supporting sections.
- (iii) Only reinforced sliding door panels shall be accepted. Door panels shall be at least 1.5 mm thick Mild Steel or Stainless Steel with at least two horizontal intermediate stiffening ribs.

30. Sills and Support Angles

The landing sills for all openings shall be of narrow extruded aluminium. Grooves in all sills for the door guides shall be machine planed with minimum clearances for the guides. The sills shall be supported on steel angles provided by the lift Contractor and securely fastened to the building floor construction.

31. Toe Guards

Toe guards shall be of at least 1.5 mm thick steel and shall be installed on all landings. They shall extend the full width of the door opening and be gradually bevelled to the wall. The straight vertical portion of the guards shall at least be 400 mm long or as in the case of the lowest landing shall equal the distance travelled by the car sill from the bottom terminal landing to when the car is on the fully compressed buffer.

32. Car Position Indicators

- (a) Electronic LED digital readout position indicators shall be incorporated in each lift car operating panel at a height of not less than 2100 mm above the floor. As each lift travels through the lift shaft, its position shall be indicated continuously by the illumination of the numeral or letter corresponding to the landing that the lift is stopped at or is passing.
- (b) The digital readout shall be at least 50 mm in height.

33. Car Operating Panel (COP) for Passenger and Goods/Passenger Lifts

- (a) The operating device for each lift shall include a series of buttons, numbered to correspond to the active landings served and various additional buttons and key switches, including emergency alarm, intercom, door open and door close buttons, independent control, fire control and rear door control key switches.
- (b) The car call buttons shall be numbered to correspond to the landings served or the numbers shall be engraved with recessed background adjacent to the car buttons.
- (c) Car, landing and emergency buttons shall be of the Micro push operation type and shall be approved in terms of the Occupational Health and Safety Act. Each button shall be clearly marked with its corresponding floor position. The demarcation shall either comprise a raised or recessed numeric or alphabetic character. Car call buttons shall have Braille incorporated into the button unit.
- (d) The car operating station shall be paraplegic friendly and shall be located so that all operating and emergency buttons are located between 1500 mm and 900 mm above the car platform. The emergency buttons and switches shall be mounted at the bottom and the call buttons in numerical order starting above the emergency button and numbering from left to right.

- (e) Swing front return panels used in the passenger car enclosures shall be arranged so that the call buttons and the control and signal devices are substantially flush to the vertical surface and shall be mounted on the return panel. The wiring to the individual components shall permit the panel to swing open for maintenance purposes.
- (f) A second rear door car-operating panel for lifts with two entrances shall operate independently to the front panel and shall comply in full with this section.
- (g) As a standard the lift signage shall include No Smoking, Load, Passengers, Certificate Number and Lift Number / Designation, as required by the applicable standards and regulations. All signage shall be engraved into the Car Operating Panel.
- (h) Without exception the Representative/Agent shall approve the final design of the car-operating panel before placing the order or manufacture of this equipment.
- (i) The number of Car Operating Panels per lift shall be as nominated by the Representative/Agent.
- (j) The button markings/engraving shall be such that it does not fade or wear with continuous operations. The markings, whether engraved or raised shall remain clearly visible and the coloured epoxy shall remain intact throughout the life of the button.
- (k) All key switch cylinders in the fixture faceplates of landing stations, car stations and supervisory control stations shall be master keyed with removable core cylinders (KABA type or equivalent).

34. Call Acknowledging Lights

All car and landing buttons shall be of the call acknowledging type. The registering of a call button shall illuminate the button to acknowledge that a call has been registered. Incandescent indicator lamps shall not be accepted.

35. Landing Call Buttons

35.1 Passenger and Goods/Passenger Lifts

- (a) A riser of landing micro push button stations shall be provided. Terminal floors shall contain a single button station and intermediate floors shall contain both up and down buttons. Pressure on the button in one fixture shall cause the electronic illumination of the corresponding button unit in the other fixture at the same landing. Incandescent button illumination shall not be accepted.
- (b) Landing push buttons shall be of the Micro push operation type and shall be approved in terms of the Occupational Health and Safety Act.
- (c) The location of the centreline of each landing micro push button fixture shall be located at 1050 mm above the floor.
- (d) Each button shall be clearly marked with its corresponding direction of travel. The demarcation shall either comprise a raised or recessed approved symbol.
- (e) The button markings/engraving shall be such that it does not fade or wear with continuous operations. The markings, whether engraved or raised shall remain



clearly visible and the coloured epoxy shall remain intact throughout the life of the button. Buttons shall have Braille incorporated into the button unit.

36. Waiting Passenger Lanterns and Gongs

- (a) Provide an up and down, LED digital readout electric indication waiting passenger lantern at each intermediate landing and an up or down single indication lantern at a terminal landing of all lifts. The lanterns shall be mounted above the head jamb or beside the side jamb of each typical entrance. Incandescent indicator lamps shall not be accepted.
- (b) Supply and fit adjustable electronic arrival gong to each entrance. The fixture face plate shall contain an approved pattern of slots to enable the transmitting of the sound from within the shaft to the lift foyer. In terms of the paraplegic/blind person's requirements the gongs shall have a different tone when announcing cars travelling in the up and down directions - two "gongs" for down and one "gong" for up.
- (c) As soon as a lift has reached a predetermined distance from a landing and is going to stop at that landing, the corresponding waiting passenger lantern shall be illuminated and the gong shall sound whether or not a landing call has been registered. The waiting passenger lantern shall remain illuminated until the lift leaves the landing or if the car becomes filled, whichever occurs first.
- (d) The type and design of the landing signals shall take into account long lift lobbies associated with groups of lifts installed adjacent to each other. After installation the landing direction and/or announcing arrows shall be clearly visible from any position within the lift lobby. It shall be the Contractor's responsibility to inform the Representative/Agent if the selection of landing signal design is not going to achieve the visual requirements detailed under this section.
- (e) As an exception and if specifically requested by the Contractor and accepted in writing by the Representative/Agent, adjustable gongs may be fitted to the car. Gongs fitted to the car shall be positioned in the header section of the car and the sound shall be contained and directed towards the entrance so as not to be transmitted to the floors above and below the lift. The gongs shall further only sound when the lift is within 200 mm from the landing level.
- (f) As an exception and if specifically requested by the Contractor and accepted in writing by the Representative/Agent, announcing arrows may be fitted in the side jambs or incorporated in the push button unit. However, this option shall be restricted to Simplex and Duplex units with a single riser of buttons.

37. Landing Position Indicators

- (a) Electronic LED digital readout position indicators shall be provided over the architrave of each lift in the main lift lobby. As the lift travels through the lift shaft, its position shall be indicated continuously by the illumination of the numeral or letter corresponding to the landing that the lift stopped at or is passing.
- (b) The final number of landing indicators required for each lift and their locations shall be as approved by the Representative/Agent.

- (c) The digital readout shall be at least 50 mm in height.
- (d) Landing position indicators shall not illuminate if the lift can no longer respond to calls as a result of a fault condition or when undergoing routine maintenance.

38. Landing Doors and Architrave Finishes

- (a) All stainless steel landing doors and architraves shall be cleaned prior to final acceptance and receive a coat of an approved stainless steel polish.
- (c) When spray painting the landing doors and frames, the Contractor shall ensure that the landing door panels are satisfactorily prepared before the final coat of Duco is applied.
- (d) Floor designation shall be permanently marked on the inside of the landing doors (shaft side).

39. Lift Intercom System

- (a) Provide an intercommunication system complete with talk-back speakers with all required auxiliary equipment, wiring and a six (6) hour minimum back-up power supply.
- (b) Lift travelling cables shall contain two (2) shielded pairs of conductors for each car for the intercommunication system.
- (c) Terminal strip boxes for all wiring shall be provided.
- (d) All wires in the wiring system shall be shielded without exception.
- (e) Wiring between all master stations in the building shall comply with manufacturer's recommended standards.
- (f) Provide one sub-station in each lift car, one master station for each motor room and one master station for the security control room.
- (g) The voice link shall constantly produce a sound/speech quality comparable to that of the normal Telkom telephone network. All provisions to adequately address interference in the lines shall be included. The intercom master stations shall include an indicator system/panel to indicate the lift car initiating the emergency call and an "All Call" feature to allow for communication to all lifts at the same time.
- (h) The lift intercoms for all the lifts shall be wired back to a common security/control room centrally located.
- (i) The Master Stations shall be capable of accommodating all the lifts covered under this Specification. The individual lift's designation and its call code shall be clearly and neatly displayed on the Master Station.

40. Load Switches

All load switches and sensors which influence the control and the drive shall be adjusted in order to achieve an optimum operation, and their operating loads documented for future reference on the data sheet or certificate of compliance SANS1545. These load



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

contacts may include but are not limited to the over-load, minimum load and the landing call by-pass functions.

41. Car Top Requirements

42.1 Car Top Working Platform

Securely fitted working platforms of adequate strength shall be provided on the top of the car roof to create a level and safe working area. The platform shall be free of any electrical cabling and lift equipment. The car roof shall not be regarded as a working platform.

42.2 Car Top Guard Rails

In terms of SANS 1545 the car top shall be provided with a balustrade (guard-rail) where the free distance in the horizontal plane beyond and perpendicular to its outer edge exceeds 300 mm.

SECTION 3 – OPERATIONAL REQUIREMENTS

1. Simplex Selective-Collective Automatic Operation

1.1 Passenger & Goods/Passenger Lifts

- (a) The operation of lifts shall be from the landing buttons and from the call buttons in the car-operating panel. Single call buttons shall be mounted at each terminal landing and "up" and "down" buttons at each intermediate landing.
- (b) The operation shall be such that momentary pressure on one or more car or landing buttons, other than those for the landing at which the lift is standing, shall start the lift, provided the interlock circuits are established and cause the lift to stop at the first landing for which a car or landing call is registered corresponding to the direction calls registered and these stops shall be made in the order in which the landings are reached, irrespective of the sequence in which the calls are registered provided the call for a given landing is registered sufficiently in advance of the arrival of the lift at that landing to permit the stop to be made.
- (c) If there are no car calls and the lift starts up in response to several down calls, the lift shall proceed to the highest down call and then reverse to collect the down calls. Up calls shall be collected similarly when the lift starts down in response to such calls. If the lift stops for a landing call the direction of travel shall be anticipated and maintained for a predetermined interval and independent of additional car and landing calls registered in the opposite direction of the anticipated travel.
- (d) If down landing buttons are pressed while the lift is travelling up, the lift shall not stop at these landings, but these calls shall remain registered. After the highest car and landing calls have been answered the lift shall reverse automatically and respond to car and landing calls registered below the lift. When travelling down, the lift shall not respond to up landing calls, but these calls shall remain registered and be answered on the next up trip.
- (e) After the lift has answered the last call and after a pre-set time period, normally **20-seconds**, the lift shall be dispatched to a nominated Boarding Floor. Provision must be made to have this automatic return feature disabled if required.

1.2 Access Goods Lifts Only and Dumbwaiters

- (a) Each landing shall be provided with the number of buttons corresponding to the number of landings served.
- (b) The lift shall have a call and send operation. The lift shall respond to one call at a time and this call shall be the first call registered.
- (c) As the lift arrives at a landing a gong or buzzer shall sound for an adjustable time. The adjustable time shall be pre-set to 30 seconds.
- (d) Should the lift be standing at a landing with open doors and it is called from another floor, a gong or buzzer shall sound on the landing that the lift is standing for an adjustable time before the doors close and the lift moves to answer the call. The adjustable time shall be pre-set to 30 seconds.

2. Group Automatic Operation – Two or More Lifts in a Group

2.1 Automatic Operation

- (a) The operation of passenger lifts shall be group automatic operation arranged, dispatched and controlled by a group supervisory system. The system shall be supervised by a re-programmable minicomputer or microprocessor system.
- (b) Each lift shall be arranged for automatic operation without attendant through the car and landing buttons in conjunction with a group supervisory system that is re-programmable by the replacement of pre-programmed EPROM's. This re-programming shall be possible without making changes to the lift hardware or shaft or machine room fixed wiring.
- (c) Group, lift, car and drive control commissioning parameters shall be software "switches" and it shall be possible to fine tune these variables using a permanently installed terminal or test tool.
- (d) The starting of a lift shall be contingent upon the establishing of its door interlock circuit. The lifts shall automatically slow down and stop level at the floors in response to car and landing calls. A landing call shall be automatically cancelled as the lift slows down and while stopped to prevent other lifts from responding to the same call.
- (e) Whenever a lift is returned to group automatic operation after being operated on for inspection, independent, or firemen service, the lift shall immediately take its place in the group.
- (f) Car doors shall be prevented from closing or may be reversed while closing by the electronic door control system, the protective leading edge on the car door or by pressing the door open button in the car operating panel.
- (g) The door open dwell times shall be software adjusted so that the open time for a car call is shorter than that for landing calls.
- (h) All car and landing calls shall be cancelled as they are answered.

2.2 Group Supervisory System

Each group of lifts shall be provided with a software programmable automatic supervisory group system arranged to co-ordinate effectively the movement of the individual lifts of the group so as to provide the maximum efficiency in serving the passenger service requirements.

2.3 Group Control Dispatching System

The dispatching system or group control system shall be de-centralised and the lifts shall not be dependent on a central control system for its effective group operation. Each lift control shall be capable of taking over the function of the group control.

2.4 Group Control Up Peak Mode

The Up Peak Mode shall be initiated automatically by recognising or anticipating traffic patterns or when a pre-determined number of cars with a loading above a predetermined weight level leave the main landing in the up direction. Cars shall be permitted to depart



from the main landing without predetermined timing. During the Up Peak, down calls shall be served by cars not immediately needed to serve up traffic.

The Up Peak shall be discontinued once a predetermined number of cars with a loading below a predetermined level leave the main landing in the up direction. To suit individual building requirements, it shall be possible to alter the variables, which activate and deactivate the Up Peak without making changes to prints, hardware, the main program or fixed wiring.

2.5 Group Control Down Peak Mode

The Down Peak condition shall be detected by monitoring the number of down landing calls, down boarding rates and down lobby arrival loadings. Under heavy Down Peak traffic, landing calls shall be grouped in sequence of registration and assigned to be served in this sequence in an approximate "first in / first out" pattern. To suit individual building requirements, it shall be possible to alter the variables, which activate and deactivate the Down Peak without making changes to prints, hardware, the main program or fixed wiring.

2.6 Group Control Distribution of Free Cars

If no car call has been assigned after the lift has answered the last call, the car and landing doors shall close and the lift shall park at this landing awaiting a further assignment of a landing call or assignment to another zone or parking floor. Cars having completed service shall be dispatched after a software adjustable time period to designated floors so that possible future calls shall not keep passengers waiting for long periods of time. The free cars shall not open their car doors when arriving at a parking floor and the doors shall remain closed until required to respond to an assigned call. The distribution of free cars shall take into account additional main landings and priority floors in the following order of priority, unless otherwise specified:

2.7 Automatic Landing By-pass

When a car load exceeds a predetermined weight level, it shall automatically bypass all landing calls in the direction of service and shall respond only to car calls. The default setting for this predetermined level shall be 65% of rated load.

2.8 Car Held Up at a Landing

Should a lift be delayed at a typical floor beyond a pre-set software adjustable time period initially set at **thirty (30) seconds**, the lift shall be disconnected from the group automatic operation and the assigned landing calls shall be re-assigned to an alternative operational lift.

2.9 Car Call Cancelling

When the car has responded to the last call in the up or down direction, the car calls shall automatically be cleared from the system to maintain optimum efficiency.

2.10 Load Weighing

Each lift shall be provided with a strain gauge load weighing device to ensure optimum service. This device shall be capable of constantly monitoring the load on the car platform with an accuracy of ± 5.0 kg.

2.11 Anti-nuisance Control

When a lift with a loading level of less than 20 kg arrives at a landing, all car calls shall be reset automatically.

2.12 Motor Generator Set Time-out

When a lift does not receive a group demand dispatch at the dispatching landing for a software adjustable time period up to 10 (ten) minutes, set initially at 5 (five) minutes, the motor generator set, if provided, shall stop and shut down the car lighting and ventilation automatically after it has opened the car and landing doors. If solid-state motion control is provided, timing devices shall be provided to accomplish this shutdown.

When a dispatch demand is received from the supervisory system by a lift whose generator is stopped, its motor generator shall automatically restart and re-energise the car lighting and ventilation circuits.

3. Operation with Independent Service

- (a) A two position key operated switch, with removable cylinder as approved by the Representative/Agent and master keyed to the building system, shall be mounted in the main car operating station of each lift specified for Independent Service Operation. When this switch is in the on position, the removal of the key from the barrel shall be prevented and the lift shall be operated from the car buttons only and independent of all other automatic or special operation modes.
- (b) The power operated car and lift shaft doors shall remain open when a lift is at a landing until a car call for another landing is registered and the door close button is pressed. If another car call has been registered, it shall be necessary, after each stop, to repress the door close button to affect the closing of the doors.
- (c) It shall further be possible to activate and de-activate this service through the remote monitoring control station.

4. Operation with Inspection

A two position switch shall be provided on top of the car enclosure to operate each lift manually during adjustment, inspection, maintenance and repair. The operating buttons shall be of the continuous pressure type and the speed of the car shall not exceed 0.63 m/s. It shall operate the car only when the car doors and all lift shaft doors are closed and all safety circuits made.

5. Emergency Operation

A two position switch shall be provided to operate each lift manually during emergency conditions, adjustment, inspection, maintenance and repair. The operating buttons shall be of the continuous pressure type and the speed of the car shall not exceed 0.63 m/s. Emergency operation shall operate the car only when the car doors and all lift shaft doors are closed and when the inspection control on top of the car is switched to normal operation. However, it shall be permitted to override the final limits, safety contacts and governor contacts.

6. Fireman's Operation

6.1 Fire Recall – Level-1

- (a) All lifts shall be equipped with Fire Control Level-1 and each group or single lift shall be equipped with a common Fire Control switch to recall the lifts (non-stop) to the nominated evacuation landing, where it shall remain parked with open doors. The switch shall be mounted in a box with a break-glass front marked "Lift Fire Control".
- (b) When the switch is activated, cars travelling away from the designated landing, shall reverse at the next served floor without opening its doors, and return non-stop to the designated ground floor.
- (c) An illuminated indicator fitted inside the car shall instruct the passengers to evacuate the lift at the designated evacuation floor.
- (d) When on Standby Power the Fire Control operation shall operate as detailed under this section in conjunction with the Emergency Control sequenced evacuation shown under Section-3 Clause 7 (Operation with Standby Power) of this Specification.

6.2 Fire Recall – Level-2

- (a) A Fire Service Key Switch mounted in the car operating panel shall be provided in each lift operating as a Fireman's Lift.
- (b) A lift operating on Fire Service shall respond only to its own car call while ignoring all landing calls. When the lift arrives at a landing not being the main landing, its car and landing doors shall remain closed. If the door open button is pressed, the doors shall open and continue opening. If the door open button is released, the doors if not yet fully open, shall immediately reverse direction and close. Once the doors have been fully opened via the door open button, they shall remain open until a further car call has been registered and the door close button has been pressed.
- (c) If more than one car call has been registered, all the remaining car calls shall be cancelled once the lift stops at the nearest car call in the direction of travel.
- (d) If the lift remains stationary at a selected floor away from the main landing with the doors closed for an adjustable time initially set at 30 (thirty) seconds, the lift shall return to the fire recall floor automatically. When the lift returns to the main landing, the doors shall open automatically and remain open awaiting a further car call.
- (e) All the car door horizontal and vertical light rays, ultrasonic and infrared detectives, shall be made inoperative during the firemen's service operation.
- (f) It shall further be possible to initiate the fire control operation through the remote monitoring control station or fire detection system. The Fire and Security Sub-Contractor shall provide a potential free contact in each lift motor room to indicate a fire condition.

7. Operation with Standby Power

7.1 Emergency Recall to Main Landing – Level-1

- (a) Provide a standby power operation which recognises the feeder arrangement and the standby power operation which automatically evacuates all lifts on each affected feeder by operating 1 (one) lift at a time to the main dispatching landing without responding to car or landing calls. The system shall subsequently permit automatic and manual selection of any lift to be released for normal operation with standby power. If any lift fails to return to its main landing within 90 (ninety) seconds, it shall automatically be disconnected from the automatic return feature.
- (b) The standby power supply shall be sized to run a predetermined number of lifts simultaneously. The Electrical Sub-Contractor shall provide the number of lifts to run and the maximum kVA available for emergency operation.
- (c) In the event of a total failure of normal power, the feeder or feeders in each group shall be transferred to the standby power source. A potential free normally closed contact shall be provided in the lift motor rooms to indicate the transfer to the standby power source. The potential free contact supplied by the Electrical Sub-Contractor shall open (fail to safety) when on standby power and the lifts will commence their sequenced evacuation.
- (d) The lifts shall be capable of operation on standby power at minimum of 100% of rated speed in both directions and at a maximum load of 100% of rated capacity for a period of 10 (ten) minutes without overheating.
- (e) All connections to the lift controls for standby power operation shall be provided in the appropriate machine rooms and all the necessary interlocking interconnection wiring among machine rooms shall be provided under this section.

7.2 Manual Release – Level-2

- (a) Once all the lifts have been evacuated in sequence to the selected main landing, a predetermined lift or lifts shall be released for normal operation automatically or manually via a remote monitoring station. All manual or automatic release shall be prevented until the automatic evacuation covered under Section-3 Clause 7.1 has taken place.
- (b) The cars nominated / selected to run on emergency power shall not be fixed and it shall, furthermore, be possible to change the lift / lifts selected to run on emergency operation without making major changes to the lift wiring or control circuitry.
- (c) In all instances the fireman's lift shall have priority when selecting a lift or lifts to run on emergency power.

8. Door Operation and Control

- (a) The car and landing doors shall open and close quietly and smoothly. Doors shall be capable of being operated by hand.
- (b) Each landing door shall be equipped with an electro-mechanical interlock so that the lift can only operate when the interlock circuit is established.
- (c) Each car door/gate shall be equipped with a mechanical lock so that the lift can only operate when the car door is locked.

- (d) An electric contact for the car door shall be provided that shall prevent the lift from moving away from a landing unless the door is in the fully closed position

9. Overload Protection

Without exception, overload protection shall be provided (SANS1545-Part-1 1999 & EN81 Code 1997). When the load in the car enclosure exceeds the rated load, a buzzer shall sound, an overload indicator shall illuminate in the car operating panel and the lift doors shall remain open and the lift blocked from travelling. The overload device shall not be active during the travel.

10. Drive Control

- (a) A fully regulated distance dependant closed loop VVVF, DC Ward Leonard, DC Direct Drive control system shall be provided and shall constantly maintain the floor levels and ride quality as specified. Lift acceleration, nominal speed and slowdown phases shall constantly be monitored and controlled against, and with reference to, distance, speed, current and voltage feedback loops. The lift drive shall be capable of bringing the lift to a standstill after a travel without a "creeping in" or "levelling in" phase i.e. a direct approach.
- (b) Driving machine and motor shall be controlled to operate the lift continuously at 100% of rated speed in both directions without overheating or hunting during levelling.

11. Ride Quality and Performance Criteria

11.1 Ride Quality Objective

The main objective is to be able to determine a ride standard and to maintain that standard by routine measurement and adjustment as necessary. The standards nominated are for lifts with rated **speeds of 5 m/s** or higher. Lower speed lifts should be able to perform better in terms of ride quality, and at worst the same parameters should be applied.

(a) Vibration

Vibration, also sometimes referred to as "quaking", is measured in three dimensions:

- Lateral quaking from front to back.
- Lateral quaking from side to side.
- Vertical vibration (up and down).

The vibration levels are measured as acceleration levels of the car floor using an accelerometer. Measurements are expressed in terms of mm/s², milli-g or LAL. - 9.81 mm/s² = 1 milli-g or LAL.

Recording accelerometer tests in the horizontal plane shall be conducted prior to practical completion on each lift travelling at rated speed the full length of the shaft between terminal landings in both up and down directions with a maximum load of 230 kg located in the centre of the platform. Recordings shall be taken on the platform in the plane of the car guide rails and perpendicular to the plane of the car guide rails.

One set of recordings for each lift shall become the property of the Employer as a permanent record. If these tests show that the equipment is in any way defective, at variance with the specified requirements, or objectionable in any operation, the Contractor shall make any change necessary to remedy these defects. All expenses for carrying out this remedial work and the costs of all subsequent tests including labour, material, test equipment, on site observations, etc, shall be for the Contractor's account.

Notice of all tests shall be given to the Representative/Agent in writing at least 96 hours prior to conducting the test.

(b) Noise Levels

Noise levels in the car are measured during operation of the lift. Maximum and mean dB (A) figures are measured.

11.2 Performance Criteria

After practical completion the Contractor shall confirm that the lift equipment performs in accordance with the contract documents and shall provide documentation to substantiate accordingly.

The lifts shall be adjusted as required to, at least meet the following performance requirements within a 10% tolerance:

(a) Ride quality

Acceleration / Deceleration: max 1.0 m/s²
 Jerk Rate: max 2.0 m/s³
 Stack changes: nil
 Shooting Off or Rollback: nil
 Car Noise: max 56 dB (A)
 Car Noise: mean 52 dB (A)

(i) Lateral Quaking ISO X & ISO Y (Velocity m/sec to Time / Drive Curve)

ISO Y = Side to side movement
 ISO X = Front to back movement

Peak to peak: max 15 milli-g
 Peak to peak: mean 5.0 milli-g
 RMS: mean 1.7 milli-g

(ii) Vertical Vibration ISO-Z (Velocity m/sec to Time / Drive Curve)

Peak to peak: max 10 milli-g
 Peak to peak: mean 3.0 milli-g
 RMS: mean 1.2 milli-g

(iii) Vertical Vibration Start and Stop Kicks

Peak to peak: max 18 milli-g

(b) Levelling Tolerance

Re-levelling: max. 3 mm
 Levelling Accuracy: max. 3 mm

(c) Cycle Time

Times specified are for a typical floor-to-floor run of 3400 mm with a balanced load.

Door close to car start: max. 0.8 sec

Rated Speed	Car Start to Car Stop
>1.6 m/s	<5.0 sec.
1.0 m/s	5.6 sec.
0.63 m/s	10.5 sec.

(d) Door Dwell Times

Passenger Conditions	Stops for Car Call	Landing Call
First Passenger	2.0 sec.	3.0 sec.
Succeeding Passengers	1.0 sec.	1.0 sec.

(e) Door Open and Close Times

<u>Door Opening</u>	<u>Type</u>	<u>Door Open</u>	<u>Door Closed</u>
900 mm	C/O	max. 2.2 sec	max. 3.0 sec
1100 mm	C/O	max. 2.2 sec	max. 3.0 sec
1200 mm	C/O	max. 2.4 sec	max. 3.2 sec
1400 mm	C/O	max. 2.7 sec	max. 3.5 sec

(f) Door Pre-Opening

Max. 3/4 open when lift is within 5 mm of floor level.



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

SECTION 4 – DETAILED LIFT REQUIREMENTS

1. General Requirement

Tenderers shall offer lifts designed to comply with the technical requirements and the as described in Sections 2 and 3 of this specification.

The equipment offered shall be suitable for continuous operations under the following conditions:

(a) Electricity Supply

3-phase, 4-wire, 50HZ, AC with nominal voltage of 400/231V varying between 95% and 105% of the nominal voltage.

(b) Ambient Air Conditions

Max. Temperature	:32°C
Min. Temperature	:15°C
Max. relative humidity	: 85%

(c) Altitude of site

2000m above sea level

All equipment of the lift installation shall be Y2K compliant in all respects.

All lifts shall comply with the latest edition of SANS1545-1 and SANS-1545-2 specifications.

Copies of ISO9002 accreditation shall accompany the tenders submitted.

The lift installation shall comply in al respects with the requirements of the Occupational Health and Safety Act, Act 85 of 1993 as amended.

2. Technical Requirements

2.1 General

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Number of Units	1
(b)	Type of Lift	Passenger
(c)	Load	1000kg
(d)	Speed	1.0 m/s
(e)	Lift Numbers	L1
(f)	Total Travel	28m
(g)	Number of Stops	3
(h)	Car Entrances	One per Lift

2.2 Machine

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Drive	Traction, VVVF or Hydraulic
(b)	Machine	Gearless
(c)	Roping	1:1 or 2:1
(d)	Automatic Self-Levelling	Yes,
(e)	Compensation	Yes,

2.3 Control Operation

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Operation	Group Automatic Operation
(b)	Up/Down Peaks	Yes, As Specified
(c)	Fireman's Floor	Ground Level
(d)	Evacuation Floor	Ground Level
(e)	Independent Control	Yes, As Specified
(f)	Load Measuring	Over Load, Landing Call By-pass, Anti-Nuisance

2.4 Landing Equipment

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Landing Doors Clear Height	2100mm
(b)	Door Operation	Single Speed, Centre Opening
(c)	Door Control	VVVF Motion Control
(d)	Position Indicator	Digital Indicators on Main Landing (Ground Level) Only
(e)	Waiting Lanterns	Yes,
(f)	Gongs	Yes,
(g)	Call Buttons	Approved, Vandal Proof Mechanical Micro-Push Button
(h)	Direction Arrows	Yes, – Above all Landing Entrances

2.5 Car Equipment

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Number of COP's	One per Lift
(b)	Protection Drapes	No
(c)	Position Indicators	Yes, As Specified on COP
(d)	Direction Arrows	Yes, As Specified on COP
(e)	Intercom	Yes, – Master Station - Security Control
(f)	Call Buttons	Approved, Vandal Proof Mechanical Micro-Push Button
(g)	Door Detectors	Yes, Ultrasonic Proximity Detectors
(h)	Signage	Yes, As Specified
(i)	Emergency Light	Yes,
(j)	Braille Call Buttons	Yes

2.6 Shaft Dimensions and Equipment

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Head Room	3800mm
(b)	Pit Sump	Supplied by Others
(c)	Shaft Lighting	Yes, As Specified

2.7 Finishes

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Fixture Faceplates	<i>Minimum 3mm thick Stainless Steel (SST) with bevelled edges and a brushed finish</i>
(b)	Car COP Faceplates	<i>Full height next to car door SST with brushed Finish</i>
(c)	Car Side Walls	<i>SST – Brushed Finish</i>
(d)	Car Rear Wall	<i>SST – Brushed Finish</i>
(e)	Car Front	<i>SST – Brushed Finish</i>
(f)	Car Floor	<i>Normament – Principal Agent to Specify Colour</i>
(g)	Car Ceiling	<i>High Quality Suspended Ceiling with recessed Fluorescent Luminaires</i>
(h)	Hand Rails	<i>At a height of 900mm above car floor on sides and rear of car</i>
(i)	Car Doors	<i>SST – Brushed Finish</i>
(j)	Landing Doors	<i>SST – Brushed Finish</i>
(k)	Landing Frames	<i>SST – Brushed Finish</i>
(l)	Landing Signals	<i>Fitted above landing entrances</i>

SECTION 5 – SCHEDULE OF TECHNICAL INFORMATION

1. GENERAL

Tenderers are required to complete the following Schedule of Technical Information and shall in addition, under separate cover, give full particulars of the equipment and installations offered as well as detailed descriptions of the various methods of control and operation.

2. TECHNICAL INFORMATION SCHEDULE

Item	Description	Details
1.	Manufacturer's name	
2.	Country of origin	
3.	% South African manufacture	
4.	Performance	
a)	Car speed in m/s	
b)	Average round trip time	
c)	Maximum carrying capacity of each lift car	
d)	Average waiting time after registration of a landing call	
5.	Main Hoist Motor	
a)	Maker's name	
b)	Type	
c)	Rated output (kW)	
d)	Time rating (starts/hr)	
e)	Manufacturing standard and safety codes	
f)	Maximum speed (RPM)	
g)	Rated voltage (Volts)	
h)	Full load current (Amps)	
i)	Starting current (Amps)	
j)	Type of bearings	
k)	Maximum line current with lift starting with full contract load (Amps)	
6.	Type of Brake	
7.	Gearing (If Applicable)	
a)	Material of worm	
b)	Material of worm-wheel	

Item	Description	Details
c)	Type of thrust bearings	
d)	Ratio of gearing	
e)	Type of worm-shaft bearings	
f)	Worm above or below wheel	
8.	Drive	
a)	Diameter of traction sheave (rope centres)	
b)	Type of grooving used on traction sheave	
c)	Type of bearing for sheave shaft	
d)	Diameter of smallest deflector pulley used	
e)	Type of grooves provided on deflector pulleys	
f)	Type of bearings for deflector pulleys	
g)	Means provided for absorption of vibration	
9.	Switch gear and Control System	
a)	Make of main circuit breaker	
b)	Rupturing capacity of main circuit breaker (kA)	
c)	Type of control system	
d)	Control voltage	
e)	Make of contactors	
f)	Make of control relays	
g)	Contact materials used for auxiliary and main contacts of controller switch gear	
h)	Type of selector	
10.	Car and Doors	
a)	Mass of complete car with doors and operating gear (kg)	
b)	Net inside dimensions(width x depth x height) in mm	
c)	Thickness of material of car and landing doors	
d)	Finish of car and landing doors	
e)	Clear width and height of car and landing entrances	
f)	Type of door drive mechanism offered	
g)	Type of suspension used for car and landing doors	
h)	Type of proximity detectors	

Item	Description	Details
(I)	For passengers approaching from landing	
(II)	For passengers leaving lift car	
i)	Type of material used for inside finishes of car (i.e. panels, ceiling trim)	
j)	Thickness and type of floorboards and floor covering	
k)	How is car and platform isolated from supporting structure?	
l)	Are car panels treated externally for sound absorption?	
m)	Door speed:	
(I)	Normal (m/min)	
(II)	On force closing (m/min)	
11.	Ropes	
a)	Maker's name	
b)	Diameter of ropes (mm)	
c)	Number of main ropes	
d)	Breaking load of each rope (kN)	
e)	Maximum working load of each rope	
f)	Factor of safety	
g)	Tensile strength of steel used (MPa)	
h)	Number of strands in rope	
i)	Number of wires per strand	
j)	Construction and lay of rope	
k)	Type of rope fastening used	
l)	System of roping (i.e. 2:1 or 1:1, single or double wrap)	
12.	Counterweight	
a)	Total mass (kg)	
b)	Percentage of live load counter balanced (%)	
13.	Guide Rails	
a)	Type and section	
b)	Mass per metre-length (kg) for:	
(I)	Car	
(II)	Counterweight	

Item	Description	Details
14.	Roller Shoes	
a)	Type	
b)	Material of tyres for roller type guides	
15.	Buffers	
a)	Type	
b)	Length of stroke	
c)	Reactions on pit floor when buffers are hit at 115% of contract speed whilst car is carrying contract load	
(I)	Car buffers	
(II)	Counterweight buffers	
16.	Safety Gear	
a)	Type	
b)	Type of governor	
c)	Stopping distance at overspeed with:	
(I)	Car empty (mm)	
(II)	With contract load (mm)	
d)	Percentage over-contract speed when governor trips safety (%)	
e)	Percentage over-contract speed at which governor trips motor supply	
f)	Is safety still effective if governor rope breaks after application of safety device?	
17.	Steelwork at Top of Shaft	
a)	Number and type of sections used	
b)	Reactions on structure must be submitted with tender by indicating position, magnitude and direction of all reactions on a drawing	
18.	Levelling	
a)	Levelling speed (m/s)	
b)	Levelling tolerance guaranteed (Maximum) (mm)	
c)	Will car and landing doors be fully open when car reaches floor level?	
d)	What is distance of levelling zone above and below floor level?	
19.	Selector Type	
20.	Deviations from Specification as an Alternative Offer: Does the equipment offered comply strictly with the	



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

Item	Description	Details
	specification (Yes/No)	

3. Deviations from Specification as Alternative Offer

If answer to 20 above is NO, tenderers shall give full details of all deviations between the alternative offered and specified equipment hereunder:

.....

.....

.....

.....

.....

.....

.....

TENDERER'S NAME AND ADDRESS

.....

.....

.....

Signature of Tenderer's
Authorised Signatory

TEL NO.

DATE :



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

SPECIFICATION FOR LIFT INSTALLATION

ADDITIONAL SPECIFICATION

OPERATING AND MAINTENANCE MANUALS

CONTENTS

1. SCOPE
2. PROCEDURE FOR SUBMISSION OF MANUALS
3. FORMAT OF OPERATING AND MAINTENANCE MANUALS
4. CONTENTS

1. SCOPE

The Contractor shall be responsible for the compilation of complete sets of Operating and Maintenance Manuals. A separate Operating and Maintenance Manual shall be supplied for each installation.

2. PROCEDURE FOR SUBMISSION OF MANUALS

2.1 Submission Of Draft Manuals

A draft copy of each Operating and Maintenance Manual shall be submitted to the Engineer prior to safety inspection of the installation. Approval of the draft Operating and Maintenance Manuals shall be a prerequisite for commencement of the safety inspection in terms of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

The manuals will be reviewed and checked by the Engineer and returned to the Contractor with comments, where necessary. The Contractor shall make the necessary changes and amendments to the manuals to incorporate the Representative/Agent's comments.

2.2 Development Of Final Manuals

A final draft copy of each Operating and Maintenance Manual shall be submitted to the Representative/Agent at least one week prior to commencement of Day 1 tests on commissioning. This set of manuals will not be accepted without the Contractor's verification of the information contained in the manuals and the professional language editing thereof. The Representative/Agent shall return the manuals to the Contractor, who shall make the final corrections. The Representative/Agent will, however, not be responsible for the quality control on manuals. Approval of final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion for repair of the installation.

After the Engineer has approved the final Operating and Maintenance Manuals, the Contractor shall provide the Engineer with seven (7) sets of the manuals. Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Completion.

3. FORMAT OF OPERATING AND MAINTENANCE MANUALS

- (a) Manuals shall be bound in hardcover lever-arch files with plastic coatings. The files shall be clearly labelled on the front cover, as well as on the back band, with the following information:
 - (i) The title "Operating and Maintenance Manuals"
 - (ii) Name of the project

- (iii) Name of the contract and contract number
 - (iv) The Contractor's name, address and contact telephone number and fax (logo optional)
 - (v) Month and year in which the manuals are finally handed over to the Employer
 - (vi) Name of the User Client.
- (b) Pamphlets and bound leaflets/booklets from suppliers or manufacturers shall be placed in plastic pockets.
 - (c) Drawings and diagrams larger than A3 shall be folded and placed in plastic pockets to be easily removed or stored.
 - (d) The sections of the manuals specified below shall be clearly partitioned.
 - (e) Cross-referencing between drawings/diagrams and text shall be in a clear and consequent format.
 - (f) The Operating and Maintenance Manuals shall be supplied in English.

2.3 Technical equipment manuals

For each piece of equipment and/or machine forming part of the installation the following information shall be included in this section of the Operating and Maintenance Manuals:

- (a) The supplier or reconditioning manual and/or standards of operating and maintenance instructions;
- (b) illustrated parts breakdown and/or group assembly drawings as agreed with the engineer;
- (c) parts lists and data sheets, including all characteristic curves for machines indicating operation point, efficiency, power consumption, etc;
- (d) calibration charts, and
- (e) test certificates for hydraulic pressure tests, flame-proof grading, materials, non-destructive examinations, coating and lining details, etc.

Each detailed description shall be accompanied by a set of engineering drawings. From the drawings the functionality of each part or component used, as well as the special characteristics associated with the part or component shall be very clear.

4.4.3 Parts and components list

A detailed description shall specify all the parts and components used for the duration of the Contract. This description shall include new parts and components, as well as existing parts and components that have either been reconditioned or used as specified in the Contract.

The description shall state at least the part or component number, part or component name, the size of the part or component, an explanatory description, the quantity used, the material of which the part or component is made, the coating (if any), date of purchase, as well as any relevant remarks as to the application thereof.



Details of the manufacturer of the part or component shall also be listed. This shall at least state the name, address, telephone number, fax number and name of a contact person.

The supplier of the part or component shall also be stated and shall include at least the name, address, telephone number, fax number, name of a contact person and an alternative supplier (if available).

4.4.4 Drawings

Drawings shall contain a descriptive heading, an explanatory key and relevant comments. Drawings shall be done on a computer-aided design package approved by the Representative/Agent.

A compound drawing for all subassemblies shall clearly indicate how and where the various parts fit in the subassembly. The compound drawing shall be linked to the equipment data sheets and parts and components list and shall clearly specify the parts or components used, their model numbers, their sizes and the quantities used. The compound drawings shall also be accompanied by a short description explaining the workings of the subassembly, as well as the assembly of the parts or components to complete the subassembly.

4.5 Operating Procedures

The operating instructions shall be a step by step description of the manual start-up and shut-down procedure for every piece of equipment and/or process reconditioned, repaired or supplied with references to the MFDs. For automatic operation the operators shall be referred to the automatic control manual (if applicable).

The functioning of the installation shall be clearly described, using a flow diagram depicting the interrelationships among the various subassemblies. The subassemblies shall be described by descriptive drawings.

Each mechanical or process flow diagram shall contain at least a heading, relevant comments and a key.

Every subassembly shall also have its own flow diagram explaining the operation of the subassembly, as well as the application of each part and component. The application of the subassembly shall also be very clear. The flow diagram shall consist of at least a heading, relevant comments and an explanatory key.

A detailed description shall be given of all operational systems forming part of the installation, explaining the operation and functioning of the system and the number of operations personnel required for performing the operation successfully.

The preparations, which are required before the system can be operational, shall be clearly stated and explained.

The operation tasks shall be clearly explained with reference to dangerous situations that might occur. Hazardous operations shall be explained in great detail and cover all the applicable safety precautions.

4.6 Maintenance

4.6.1 Purpose of maintenance

The maintenance process shall be explained and the main responsibilities described.

4.6.2 Preventative maintenance

A preventative maintenance and lubrication schedule shall be included in this section. This schedule shall be in table format and shall include a summary of all the maintenance actions required for each different system and/or functional unit covered by this manual, in order to give a single summary of all routine preventative maintenance actions required for the complete installation.

The schedule shall indicate daily, weekly, fortnightly, monthly and yearly maintenance actions. A lubrication schedule summary shall also be included under this section.

The frequency of routine preventative maintenance actions shall be indicated very clearly.

The Contractor shall provide the maintenance requirements as prescribed by the manufacturer. The type of maintenance shall be clearly indicated. The description of the maintenance to be performed shall include at least the part name, location of the part in either the assembly or subassembly, the model number, the quantity of the particular part or component to be maintained, the type of maintenance, and notes on the maintenance procedure.

A brief description shall accompany the maintenance schedule, indicating special tools to be used, maintenance and test equipment required for the test procedures. Any special tools necessary for maintenance shall be specified in terms of name, model, size, manufacturer, supplier (name, telephone number, fax number, contact person), coating (if any) and notes on the use of the equipment.

Remarks on the system readiness checks of each subassembly shall be explained in detail. Routine inspection and maintenance processes shall be described. It shall be very clear what needs to be done, how to perform the necessary task and any dangers that are present.

4.6.3 Trouble-shooting

An explanation shall be given to assist the maintenance personnel in analysing and resolving malfunctions that might occur. Various scenarios with possible causes and rectification procedures shall be explained.

The scenarios shall be accompanied by drawings indicating the position of the part that is faulty. Each of these drawings shall have a heading, comments and an explanatory key.

4.7 Breakdown Maintenance And Repair

The Contractor shall describe the complete procedure to be followed in the event of a breakdown. It shall be very clear what the operating personnel should look for, how to eliminate any dangers due to the breakdown (e.g. electricity must be shut off in the event of problems with the wiring) and who should be contacted. The Contractor shall supply the names and telephone numbers of at least two contact persons who may be contacted in the event of a breakdown.

Repair instructions shall provide the maintenance personnel with detailed instructions for the removal and/or replacement of any item requiring replacement due to malfunctioning.



NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE PORTION 10 STERKLOOP 688-LS POLOKWANE

Contact numbers shall also be given to assist maintenance personnel, should a breakdown occur.

The Contractor shall specify the actions expected of maintenance personnel in the event of a breakdown.

The Contractor shall also specify the testing procedures to be followed before the system can be put into operation again. Every procedure shall be described clearly and all the potential dangers pointed out, as well as the precautions that have to be taken.

The testing procedures shall be accompanied by drawings illustrating the process to be performed. Every drawing shall have a heading, comments and an explanatory key.

VARIABLE REFRIGERANT FLOW / VOLUME (VRF) / (VRV) HVAC SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Variable Refrigerant Flow System (VRF),
- B. Variable refrigerant system includes:
 - 1. Outdoor/condensing unit(s).
 - 2. Indoor/evaporator units.
 - 3. Branch selector units / Mode Control Units.
 - 4. Refrigerant piping.
 - 5. Control panels.
 - 6. Control wiring.

1.02 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute; 2008.
- B. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2011.
- C. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc; 2013, Including All Addenda (ANSI/ASHRAE/IES Std 90.1).
- D. ITS (DIR) - Directory of Listed Products; current edition.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.
- G. ASHRAE Standard 15-2013, Safety Standard for Refrigeration Systems.
- H. ASHRAE Standard 34-2013, Designation and Classification of Refrigerants.
- I. Dubai Municipality Green Building Regulations

1.03 GENERAL

- A. The VRF comprises of outdoor units, indoor units, AHU's, OAHU's MUAHU's, refrigerant controllers, electronic controls, sensors, thermostats, wires, joints, headers. The entire system shall be engineered and supplied by the same manufacturer.
- B. Where external static pressures (ESP): ESP values are listed for the Equipment; these are indicative only and must be confirmed by the manufacturer of the VRF system units.
- C. Contractor shall calculate the actual ESP requirements for all extract fans based on approved shop drawings and Contractor selected fittings / accessories.
- D. Contractor shall satisfy themselves at the time of tender that the ESP allowances are sufficient to meet the design intent and if not, to make sufficient allowances for any additional costs due to changes in fan size and/or associated electrical switchgear arising out of the ESP calculation.
- E. The Contractor's VRF / VRV fan selections shall be based on the calculated ESP's and the Contractor shall include the ESP calculations within the Material Submittal. The Engineers review and approval of Contractors submittal does not relieve the Contractor of their responsibility to ensure that the ESP calculations are accurate. In the event it is found that the installed equipment is unable to meet the actual ESP requirements of the installed system, the Contractor shall carry out necessary rectification work including, but not limited to replacing

blowers, motors, ductwork, grilles, accessories, switchgear, wiring and any associated Authority approvals. All costs in this regard shall be borne by the contractor.

- F. Allowance must be made in fan selections for duct leakage.
- G. Only product which have been in use in the local market for at least 5 years and which are supported by a well-established local agent with suitable service facilities shall be considered.
- H. System components shall be environmentally suitable for the intended location and application, and shall not constitute a health, fire or other safety hazard.
- I. Refrigerant shall be R410a.
- J. Unit performance requirements refer to Section 23 0003 the Schedule of Equipment.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings shown in the contract documents:
 - 1. Outdoor/Central Units:
 - a. Refrigerant Type and Size of Charge.
 - b. Cooling Capacity: kW.
 - c. Heating Capacity: kW.
 - d. Cooling Input Power: kW.
 - e. Heating Input Power: kW.
 - f. Operating Temperature Range, Cooling and Heating.
 - g. Air Flow: Cubic meters per second.
 - h. Fan Curves.
 - i. External Static Pressure (ESP): (Pa).
 - j. Sound Pressure Level: dB(A).
 - k. Electrical Data:
 - 1) Maximum Circuit Amps (MCA).
 - 2) Maximum Fuse Amps (MFA).
 - 3) Maximum Starting Current (MSC).
 - 4) Full Load Amps: (FLA).
 - 5) Total Over Current Amps: (TOCA).
 - 6) Fan Motor: kW (HP).
 - l. Weight and Dimensions.
 - m. Maximum number of indoor units that can be served.
 - n. Maximum refrigerant piping run from outdoor/condenser unit to indoor/evaporator unit.
 - o. Maximum height difference between outdoor/condenser unit to indoor/evaporator unit, both above and below.
 - p. Control Options.
 - 2. Indoor/Evaporator Units:
 - a. Sensible and Total Cooling Capacity: kW.
 - b. Heating Capacity: kW.
 - c. Cooling Input Power: kW.
 - d. Heating Input Power: kW.
 - e. Air Flow: Cubic feet per minute (Cubic meters per second).
 - f. On Coil Conditions: (°C dB / °C wB)
 - g. Off Coil Conditions: (°C dB / °C wB)
 - h. Fan Curves.
 - i. External Static Pressure (ESP): (Pa).
 - j. Sound Pressure level: dB(A).

- k. Electrical Data:
 - 1) Maximum Circuit Amps (MCA).
 - 2) Maximum Fuse Amps (MFA).
 - 3) Maximum Starting Current (MSC).
 - 4) Full Load Amps (FLA).
 - 5) Total Over Current Amps (TOCA).
 - 6) Fan Motor: HP (W).
 - j. Maximum Lift of Built-in Condensate Pump.
 - k. Weight and Dimensions.
 - l. Control Options.
- 3. Control Panels: Complete description of options, control points, zones/groups.
- B. Shop Drawings: Submit installation drawings custom-made for this project; include as-designed HVAC layouts, locations of equipment items, refrigerant piping sizes and locations, condensate piping sizes and locations, remote sensing devices, control components, electrical connections, control wiring connections. Include:
 - 1. Detailed piping diagrams, with branch balancing devices.
 - 2. Condensate piping routing, size, and pump connections.
 - 3. Detailed power wiring diagrams.
 - 4. Detailed control wiring diagrams.
 - 5. Locations of required access through fixed construction.
 - 6. Drawings required by manufacturer.
- C. Operating and Maintenance Data:
 - 1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
 - 2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
 - 3. Identification of replaceable parts and local source of supply.
- D. Project Record Documents: Record the following:
 - 1. As-installed routing of refrigerant piping and condensate piping.
 - 2. Locations of access panels.
 - 3. Locations of control panels.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of equivalent units and shall have been in satisfactory commercial or industrial use in the UAE for at least 5 years prior to tender.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle equipment and refrigerant piping according to manufacturer's recommendations.

1.07 WARRANTY

- A. Provide manufacturer's warranty for five years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Refer to the List of Manufacturers & Suppliers Section 23 0002,

2.03 OUTDOOR CONDENSING UNITS.

- A. Outdoor/Condensing Units: Air-cooled DX refrigeration units, designed specifically for use with indoor/evaporator units; factory assembled and wired with all necessary electronic and refrigerant controls; modular design for ganging multiple units.
1. Refrigeration Circuit: Inverter scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
 2. Refrigerant: Factory charged.
 3. Variable Volume Control: Modulate compressor capacity automatically to maintain constant suction and condensing pressures while varying refrigerant volume to suit heating/cooling loads.
 4. Capable of being installed with wiring and piping to the left, right, rear or bottom.
 5. Capable of heating operation at low end of operating range as specified, without additional low ambient controls or auxiliary heat source;
 6. System must be able to change between cooling and heating from selection at the thermostat. During heating operation, reverse cycle (cooling mode) oil return or defrost is not permitted, due to potential reduction in space temperature.
 7. Sound Pressure Level: As specified, measured at 3 feet (one meter) from front of unit; provide night setback sound control as a standard feature; three selectable sound level steps of 55 dB, 50 dB, and 45 dB, maximum.
 8. Power Failure Mode: Automatically restart operation after power failure without loss of programmed settings.
 9. Safety Devices: High pressure sensor and switch, low pressure sensor/switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers. Compressor/fan: Over-heat protection/Thermal switch
 10. Provide refrigerant sub-cooling to ensure the liquid refrigerant does not flash when supplying to us indoor units.
 11. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.
 12. Controls: Provide contacts for electrical demand shedding.
 13. Condensers heat exchangers shall have 1000hours Anti-corrosion salt and acid rain protection and Blue Fin coating as a standard with Pre-coated galvanized metal casings.
 14. Outdoor unit controls shall vary the inverter compressor's speed to meet refrigerant loads.
 15. Accumulator shall be capable of storing 80% of refrigerant in pump down condition.
 16. Refrigerant: Refrigerant circuits factory-charged with dehydrated air, for field charging.
- B. Unit Cabinet: Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.
1. Designed to allow side-by-side installation with minimum spacing.
 2. Units to be placed on suitable weatherproof Vibration Eliminators / Pads.
- C. Fans: One or more direct-drive propeller type, vertical discharge, with multiple speed operation via DC (digitally commutating) inverter.
1. Provide minimum of 2 fans for each condensing unit.
 2. External Static Pressure: Factory set at 30 Pa, minimum.
 3. Indoor Mounted Air-Cooled Units: External static pressure field set at 80 Pa, minimum; provide for mounting of field-installed ducts.
 4. Fan Airflow: As indicated for specific equipment.

5. Fan Motors: Factory installed; permanently lubricated bearings; inherent protection; fan guard; output as indicated for specific equipment.
- D. Condenser Coils: Copper tubes expanded into aluminum fins to form mechanical bond; waffle louver fin and rifled bore tube design to ensure high efficiency performance.
- E. Compressors: Scroll type, hermetically sealed, variable speed inverter-driven and fixed speed in combination to suit total capacity; minimum of one variable speed, inverter driven compressor per condenser unit; minimum of two compressors per condenser unit; capable of controlling capacity within range of 6 percent to 100 percent of total capacity.
 1. Multiple Condenser Modules: Balance total operation hours of compressors by means of duty cycling function, providing for sequential starting of each module at each start/stop cycle, completion of oil return, and completion of defrost, or every 8 hours.
 2. Failure Mode: In the event of compressor failure, operate remaining compressor(s) at proportionally reduced capacity; provide microprocessor and associated controls specifically designed to address this condition.
 3. Provide each compressor with crankcase heater, high pressure safety switch, and internal thermal overload protector.
 4. Provide oil separators and intelligent oil management system.
 5. Provide spring mounted vibration isolators.

2.04 INDOOR/EVAPORATOR UNITS

- A. All recirculating AHU's, OAHU's & MUAHU's unit construction and specification shall comply with the specification Section 23 7313 Modular Central Station AHUs and shall be suitable for External / Exposed application.
- B. All recirculating DX - FCU's unit construction and specification shall comply with the specification section 23 8101 Terminal Heat Transfer Units.
- D. DX Coils: Direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
 1. Provide thermistor on liquid and gas lines.
 2. shall be coated with Heresite or equal protective coatings.
- F. DX Evaporator coil selections shall be AHRI Certified selections at the specified On Coil and Ambient Conditions.
- H. Indoor units shall regulate refrigerant flow by electronic expansion valves.
- I. Condensate Drainage to provided as per Section 23 7313 and Section 23 8101.
- K. Access must be provided to filter, fan and motor drip tray, valves and controls for maintenance and replacement in-situ.
- L. Contractor shall verify that specified space noise levels are not exceeded.
- M. Each indoor unit must be treated as an individual zone.
- N. The VRF shall be factory tested with a certified quality assurance system and shall be manufactured in a facility with an ISO 14001 certified environmental management system.

2.05 CONTROLS, SAFETIES AND DIAGNOSTICS

- A. Unit controls shall include as a minimum: microprocessor, LOCAL/OFF/REMOTE switch, and a 6-digit diagnostic display with keypad. Control module shall be cooled by Refrigerant for the outdoor unit and components shall be rated for withstanding high ambient temperature upto 55°C.
- B. All FCU and recirculation units: Factory assembled and tested DX units, with electronic proportional expansion valve, control circuit board, factory wiring and piping, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.

- C. Temperature Control Mechanism – DX FCU's and DX AHU's, shall be factory calibrated thermostats with the following sensing capability:
 - 1. Space temperature sensing within the Thermostat.
 - 2. Remotely located wall mounted space sensor probe.
 - 3. Remotely located return air duct sensor probe.
 - 4. User friendly digital display with adjustable cooling and heating mode set points.
 - 5. 0.5°C setpoint adjustment increments.
 - 6. Thermostat display to show room temperature 5 seconds after setpoints have been adjusted.
- D. Temperature Control Mechanism – DX OAHU's and DX MUAHU's, shall be factory calibrated controllers with the following capability:
 - 1. Remote located off coil sensor with a minimum 0°C to 55°C operating band.
 - 2. Ambient air sensor with a minimum 0°C to 55°C operating band.
 - 3. User friendly digital display with adjustable cooling and heating mode set points.
 - 4. Controllers to be capable of controlling off coil condition to $\pm 0.5^\circ\text{C}$ of setpoint.
 - 5. Programmed to automatically switch between winter heating and summer cooling based on a user adjustable setpoint reset.
- E. Unit controls must allow for Automatic compressor lead/lag switching.
- F. Either a display module or serial connection port (for external connection), on the outdoor unit shall be capable of displaying set points, system status (including temperatures, pressures, run time and percent loading) and any alarm or alert conditions. This module, in connection with the microprocessor, shall be capable of displaying the output of a full load run test to verify operation of every switch, sensor, fan and compressor before unit is started.
- G. Unit shall be equipped with all necessary components, and in conjunction with the control system shall provide the unit with protection against the following
 - a. Loss of refrigerant charge.
 - b. Reverse rotation.
 - c. Low oil pressure (per compressor).
 - d. Voltage imbalance.
 - e. Ground current fault.
 - f. Thermal overload.
 - g. High pressure.
 - h. Electrical overload,
 - i. PC Board Fuse
- H. The condensing unit shall have a Composition sensing circuit (CS Circuit) to monitor the makeup of the refrigerant
- I. Controllers must have option of automatic group control.
- J. Fan motors shall be individually protected by a circuit breaker.
- K. Control shall provide general alarm remote indication for each refrigeration circuit.
- L. Where BMS interface is specified, unit manufacturer shall include a BACnet interface so as to monitor / control following parameters from BMS:
 - a. ON/OFF control
 - b. Operational status monitoring
 - c. Alarms monitoring
 - d. Monitor space temperatures.
 - e. Adjust set-points
 - f. Monitor and reset filter dirty alarm
- M. Control system shall have a RS485 serial output port or equal.

- N. VRF Manufacturer shall provide a GATEWAY to communicate with BMS.
- O. Additional controls required as detailed later in this specification.
- P. Contractor to submit control philosophy and control schematic to MEPD Engineer for approval.

2.07. OPERATING CHARACTERISTICS

- A. Unit shall be capable of delivering the specified capacities at outdoor ambient temperatures from 0°C to 46°C.
- B. Unit shall be capable of operating without tripping at ambient condition of 54°C.
- C. The complete control system for the unit shall be suitable for installation outdoors and shall be capable of operation at temperatures up to 54°C and relative humidity up to 100%RH (non-condensing). Where required, provide panel heaters to eliminate condensation.
- D. Fan Coil Units shall be selected at medium speed to provide the specified capacities against the system resistance.
- E. The system shall be tested by a recognised 3rd party as per AHRI 1230:2010 and shall meet or exceed relevant Local Standards like ESMA, Estidama, SASO, & MEW etc.
- F. The equipment manufacturer shall be fully certified and registered to comply in the areas of CE, Eurovent, ISO9001 and ISO14001.

2.08. ELECTRICAL REQUIREMENTS

- A. Shall meet DEWA regulations on Starting current and comply with the DEWA circular in relation to the equipment above 50 / 100 kW electrical load connected to the project's electrical system.
- B. Unit electrical power supply shall enter the unit as per manufacturer's requirements.
- C. Outdoor Unit shall operate on 3-phase power supply.
- D. Indoor Unit shall operate on a 1-phase power supply.
- E. Unit with two compressors shall have a factory-installed, star-delta or part winding starter to minimize electrical inrush current (inverter start up is also acceptable)
- F. Control voltage shall be supplied by a factory-installed, non-fused electrical disconnect from the power supply

2.09. REFRIGERANT PIPING & INSULATION FOR VARIABLE REFRIGERANT SYSTEM (VRS)

- 1. Pipe sizes: depending on the equipment make selected, to be accurately calculated in conjunction with the manufacturer (VRF specialist).
- 2. Refrigerant piping lengths, piping size, joint and header selections strictly in accordance to the VRF manufacturer's requirements.
- 3. Refrigerant pipe for the VRS shall be made of phosphorous deoxidized copper using two types:
 - a. Type: Soft copper pipe (annealed copper pipe)
 - b. Type-1/2H pipe: Hard copper pipe (Straight pipe). Maximum allowed tensile stress is 61N/mm². The 0.2% proof strength shall be 61N/mm².
- 4. The maximum operation pressure of R410a air conditioner is 4.30 MPa. The refrigerant piping should ensure the safety under the maximum operation pressure. Pipe wall thickness shall be as listed in Table below. Pipes of radial thickness 0.7mm or less shall not be used. Final pipe size selection shall comply to manufacturer's requirements.
- H. Units shall be shipped with standard refrigerant charge. Unit supplier should review layout drawings to assess requirement for any additional charge. Field charging of R410a should be in liquid form and all precautions applicable for charging of the refrigerant should be followed.

- P. Refrigerant Pipe Insulation thickness shall be advised by the specialist VRF system supplier and shall be project specific. Insulation specification and thickness shall comply with Dubai Municipality's Green Building Regulations.
- Q. Vapor Barrier for all the refrigerant piping insulation shall be provided.
- C. Refrigerant pipe installation
 - 1. During brazing of pipe-work, the pipe should be continuously flushed with nitrogen to eliminate oxidation of internal surface.
 - 2. On completion of installation, pipes must be flushed and cleaned with nitrogen.
 - 3. Pipes must be pressurized with dry nitrogen to minimum 1.5 times working pressure (or as per manufacturers recommendation), and thoroughly leak tested. Systems should be left for a minimum 24 hours and if no pressure drop is observed, the system can be evacuated.
 - 4. System evacuation must be by means of a suitable vacuum pump to achieve a minimum vacuum of -101.1kPa or as per the manufacturers recommendation, and then charged (where applicable), in strict accordance with manufacturer's instructions and charge calculation.
 - 5. Vacuum drying to prevent moisture in the refrigerant circuits must be carried out.
 - 6. All tools, gauges, test instruments etc. must be able to correctly function at the operating pressures associated with R-410a.
 - 7. Pipes must be stored properly (i.e. with seal plugs, store pipes on stand). Under no circumstances must dirt enter the pipes. Any pipes found with dirt or debris inside must be replaced immediately.
 - 8. All ref-net fittings must be installed according to supplier's instructions.

2.04 MAXIMUM, REFRIGERANT LEAKAGE CONCENTRATION

- A. Contractor to ensure safety against refrigerant leakage according to local regulations or standards and must comply fully with this clause. The following standard may be applicable if no local regulation or standard is available.
- B. In case of a refrigerant leak, critical concentration specified below shall not be exceeded.
- C. Critical concentration is the refrigerant concentration in which no human would be hurt if immediate measures can be taken when refrigerant leakage happens.
- D. Critical concentration of R410a: 0.439g/m³. (The weight of refrigeration gas per 1 m³ air conditioning space.) The Critical concentration is subject to ASHRAE Standard 15. Contractor to advise if the fully charged system would exceed this amount at time of material submittal so that action can be taken.
- E. For the VRF, the concentration of refrigerant leaked should not cause critical concentrations to be exceeded.
- F. Confirm the Critical concentration and take countermeasure. The maximum refrigerant leakage concentration (Rmax) is defined as the result of the possible maximum refrigerant weight (Wmax) leaked into a room divided by its room capacity (V). The refrigerant of Outdoor unit includes original shipped charge and additional charge at the site.
- G. The additional charge shall be calculated according to the refrigerant charging calculation of each kind of Outdoor unit, and shall not be over charged at the site. Procedure 1 -3 describes computation of maximum refrigerant leakage concentration (Rmax) and countermeasures required against possible leakage.
- H. Procedure
 - 1. Follow ASHRAE Standard 15 guidelines.

2. Calculate room volume (V). If the room has a total opening area of more than 0.15% of the floor area at a low level with another room/space, the two rooms/spaces are considered as one space. The total space shall be added up.
3. Find the possible maximum leakage (Wmax) in the room. If a room has Indoor unit(s) from more than 1 Outdoor unit, add up the refrigerant charge of the Outdoor units.
4. Divide (Wmax) by (V) to get the maximum refrigerant leakage concentration (Rmax).
5. Check whether any of the rooms' Rmax exceeds 0.39kg/m³. If so, following countermeasures should be taken.
 - I. Countermeasure
 1. Provide an opening of more than 0.15% of the floor area at a low position of the wall to let out the refrigerant whenever leaked - for instance - by door undercuts.
 2. Reduce total charge (making Wmax smaller) e.g. Avoid connecting more than 1 Outdoor unit to one room, e.g. Using smaller model size but more Outdoor units, e.g. Shorten the refrigerant piping as much as possible.
 3. Fresh air in from the ceiling (Ventilation)
 - a. Note-1. Countermeasure 3 should be done in a proper way in which the fresh air supply shall be on whenever the leakage happens.
 - b. Note-2. All refrigerant pipes shall be properly tested to minimize occurrence of leakage. The piping layout and support system should consider the expansion due to the temperature variation.
 4. All refrigerant piping and fittings shall be insulated in accordance with the HVAC General Technical Specification and to VRS manufacturer's requirements.
 5. All pipe supports / trays exposed to the weather shall be hot dip galvanized or constructed of other non corrosive robust strong material. All exposed refrigerant pipes shall be protected by either cable tray covers or GI trunkings.

2.05 TRANSMISSION CABLE CONNECTION BETWEEN INDOOR & OUTDOOR UNITS

- A. Provide the necessary Control cables between the Indoor Units, ODUs, AHUs and the BMS.
- B. Follow the Electrical specifications and local authority regulations for the technical standard related to electrical equipment and wiring.
- C. Wiring for control (hereinafter referred to as transmission cable) shall be (100mm or more) apart from the power source wiring to eliminate any induced electric noise from power wiring. Do not install transmission cable and power source wiring in the same conduit.
- D. Provide designated grounding work to outdoor unit.
- E. Each signal path should be connected with separate 2-core 1,5mm² shield or as recommended by unit manufacturer.

2.06 ELECTRICAL SWITCHBOARDS AND WIRING

- A. Electrical contractor to provide 380V / 50Hz power (via cable) to: the isolator near the unit.
- B. HVAC contractor to provide: Wiring from the MCC's / Isolators to the outdoor units and indoor units.
- C. The HVAC contractor shall provide additional Voltage and Surge protectors in the DB board which covers the incoming supply to VRS system.
- D. Wiring from the fan coil units to the isolator by HVAC contractor, as well as wiring to the F.C.U.'s controls and temperature sensors and group controllers and outdoor units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that required electrical services have been installed and are in the proper locations prior to starting installation.

- B. Verify that condensate piping has been installed and is in the proper location prior to starting installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install refrigerant piping in accordance with equipment manufacturer's instructions.
- C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).
- D. Coordinate with installers of systems and equipment connecting to this system.
- E. An accredited technician must be provided in the role as a supervisor for the entire duration of the project and maintenance period. This technician shall attend and successfully complete a training course at the VRF manufacturer and obtain a certificate for passing the course. The technician shall have detailed knowledge of the VRS installation, piping installation, commissioning procedures etc.
- F. Storage strictly to supplier's recommendations.
- G. Make minimum use of pipe work connections to reduce the possibility of leaks. Coupler joints to extend pipes are not acceptable. Use single length pipes for each run.

3.03 SYSTEM STARTUP

- A. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.
- B. Adjust equipment for proper operation within manufacturer's published tolerances.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Conduct walking tour of project.
 - 3. Briefly describe function, operation, and maintenance of each component.

3.05 PROTECTION

- A. Protect installed components from subsequent construction operations.
- B. Replace exposed components broken or otherwise damaged beyond repair.

ANNEXURE C-FIRE WORKS SPECIFICATION



**NEW POLOKWANE SOFTBALL STADIUM FOR THE CITY OF POLOKWANE
PORTION 10 STERKLOOP 688-LS POLOKWANE**

POLOKWANE

FIRE SERVICES SPECIFICATION

MECHANICAL ENGINEERS



MAKONE CONSULTING ENGINEERS

Tel: 011 704 0253

Fax: 011 704 0037

Email: nkololo@makone.co.za

Website: www.makone.co.za

Contents

SECTION 1 GENERAL DESCRIPTION AND DESIGN BASE	4
1.1 SCOPE (GENERAL)	4
1.2 LOCATION	4
1.3 DESIGN BASE AND PROPOSED SYSTEM	5
1.4 SITE CONDITIONS	5
1.5 FACILITY CONSTRUCTION	5
1.6 MATERIALS AND WORKMANSHIP	5
1.7 STANDARDS & CODES	6
1.8 TENDER DRAWINGS	6
1.9 INSTRUCTIONS	7
1.10 INSPECTION AND TESTING (GENERAL)	7
1.11 TESTS AT SITE	9
1.12 TESTING AND COMMISSIONING	10
1.13 SPARES AND TOOLS	11
1.14 GUARANTEES	11
1.15 TECHNICAL DATA	12
1.16 AFTER SALES SERVICE	12
1.17 INSURERANCES	12
SECTION 2 FIRE PROTECTION SPECIFICATION	13
2.1 FIRE EQUIPMENT INSTALLATION	13
Fire Hose-reels	13
Fire Hydrants	13
Fire Extinguishers	13
2.2 PIPEWORK	14
2.3 PIPE FITTINGS	14
2.4 WELDING	15
2.5 HANGING MATERIAL	15
2.6 PAINTING	15
2.7 SIGNAGE	15
2.8 WATER SUPPLIES	15
2.9 SCHEDULES OF PARTICULARS AND INFORMATION	15
2.10 SERVICE/REPAIR PROCEDURE	16

2.10.1 FIRE HYDRANT	16
2.10.2 FIRE HOSE REEL.....	17
2.10.3 FIRE EXTINGUISHERS	18
2.10.4 FIRE SIGNS.....	19
SECTION 3 FIRE DETECTION	20
3.1 SMOKE DETECTION – L1 SYSTEM.....	20
3.1.1 GENERAL SPECIFICATIONS OF SMOKE DETECTION SYSTEMS	21
SECTION 4 AUTOMATED VOICE EMERGENCY EVACUATION AND PUBLIC ADDRESS AND SYSTEM	25
4.1 SYSTEM OVERVIEW	25
4.2 SCOPE OF WORKS	25
4.3 TECHNICAL REQUIREMENTS	26
4.4 DESIGN CRITERIA	26
4.5 SYSTEM DESCRIPTION.....	27
4.6 SUPPLY, DELIVERY, INSTALLATION, MAINTENANCE	29
4.7 SUPERVISION	30
4.8 ELECTRICAL WORK	31
4.9 SCHEDULES OF PARTICULARS AND INFORMATION	31
SECTION 5 FIRE WATER AND ATANK SPECIFICATION	35
5.1 GENERAL	35
5.2 DESIGN OF FIRE WATER TANK AND PUMPING SYSTEM	35
5.3 DIAMETERS OF WATER PIPES	35
5.4 DRAWINGS AND APPROVAL	35
5.5 WATER SUPPLY	36
5.6 PRESSURE GAUGES	36
5.7 MATERIALS.....	36
5.8 TESTING	38
5.9 OPERATING AND MAINTENANCE INSTRUCTIONS	38
5.10 INFORMATION REQUIRED WITH TENDER.....	39
5.11 FIRE TANK	39
ANNEXURE B FIRE EQUIPMENT.....	40
ANNEXURE C PARTICULARS OF THE SUBCONTRACTOR/SPECIALIST INSTALLER.....	41

SECTION 1 GENERAL DESCRIPTION AND DESIGN BASE

1.1 SCOPE (GENERAL)

This scope under general conditions together with the tender drawings, covers the design, manufacture, assembly and testing, packing for transport to site, transport, loading and unloading, handling of equipment at site, erection, testing and commissioning into service, carrying out all the acceptance tests and handing over the entire Fire Protection Services at Polokwane Softball Stadium.

This specification, together with schedule of quantities and tender drawings enclosed, covers the

- Supply and Install, manufacture, assembly & testing of manufacturer's works, delivery at site, installation, testing & commissioning into service, carrying out all acceptance tests, for **fire detection** systems.
- Supply and Install a **fire protection** equipment (Fire Hose reels, Fire hydrants, Signage and Fire extinguishers)
- Supply and Install, manufacture, assembly & testing of manufacturer's works, delivery at site, installation, testing & commissioning into service, carrying out all acceptance tests, for **fire tank, pipework and fire pumps**.
- Supply and Install, manufacture, assembly & testing of manufacturer's works, delivery at site, installation, testing & commissioning into service, carrying out all acceptance tests, for the **speaker evacuation** system.

1.2 LOCATION

The proposed facility (Polokwane Softball Stadium) is located in Polokwane Limpopo in the Republic of South Africa.

- ❖ Physical Address: Sterkloop No. 688 Polokwane

1.3 DESIGN BASE AND PROPOSED SYSTEM

All Fire Equipment shall be supplied and installed based on SANS 10400 part T. The systems are installed on the areas shown on the attached plans (Drawings are attached in the tender document)

- ❖ Fire Protection systems drawings
- ❖ Fire Detection drawings
- ❖ Speaker Evacuation system drawings
- ❖ Sectional steel tanks and pumps drawings

1.4 SITE CONDITIONS

The following weather parameters for the town of Johannesburg shall be used on the project:

- ❖ Elevation (1310m)
- ❖ Design DB Temperature (36.1°C)
- ❖ Design WB Temperature (18.6°C)
- ❖ Maximum DB temperature (36°C), Relative Humidity, RH (50%)
- ❖ Barometer (86 .380 kPa)

1.5 FACILITY CONSTRUCTION

The facility details are available with the Client. Agency may collect relevant data for reference.

1.6 MATERIALS AND WORKMANSHIP

All materials used shall conform to the requirements of materials specified in this specification and Green Facility Council of South Africa (GBCSA). Where material requirements are not specified they shall conform to the applicable standards and codes approved by the Client. All materials/equipment shall be new free from defects and first

class in all respects. Parts shall be free from flaws and objectionable imperfections and shall be machined true in a workman like manner. No deviations from the specified materials are permissible. Wherever materials are not specifically called out, they shall be properly selected by the contractor to the best standards for the particular application and with the prior approval of the Engineer.

1.7 STANDARDS & CODES

The design, manufacture and performance of equipment shall comply with all currently applicable statutory regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the requirement of the latest editions of applicable SANS 10400 part T and SANS 10287. The contractor shall refer the relevant sections of this specification for equipment standards and codes. Nothing in this specification shall be constructed to relieve the contractor of his responsibility.

1.8 TENDER DRAWINGS

1.8.1: List of Drawings are enclosed which have been prepared by the Mechanical/Fire system's design Engineer showing the locations and systems equipment layout & schematic diagram for fire protection systems.

1.8.2: The equipment layout shown on the drawings represent a feasible scheme based on space available and services routes. The contractor may rearrange the space allocated subject to the approval by the Mechanical Engineer and Client.

1.8.3: Where the drawings and specification conflict, the most stringent shall be followed. The instruction of the consultant shall be final & binding. The Tenderer shall point out all deviations from the drawings and specifications in their offer and shall specifically confirm works not included in the scope. Nothing extra shall be payable on any account thereafter unless instructed by the Engineer or client.

1.9 INSTRUCTIONS

The contractor's proposal must include everything required to make a complete working of the system with all statutory approval whether specifically shown and specified or not including all labour and material, transportation etc. necessary for the complete installation of everything described and provided to complete the system and ready for Owner's use. It shall be the responsibility of tenderer to check the suitability & site constraints for installing the system at site.

Any apparatus, appliance material and labour which may be necessary to complete the work in accordance with the intent or purpose of these specifications and as instructed by the engineer. The execution of the project shall be furnished by the contractor without extra cost irrespective of specifically specified in and / or shown on the drawings, or not.

The work shall be done in conformity to the specifications, accompanying drawings and with the requirement of the general, architectural and structural plans & other regulatory & statutory bodies including DPW if required.

1.10 INSPECTION AND TESTING (GENERAL)

The contractor shall perform all tests and inspection necessary to ensure that the material and workmanship conform to the requirements of the contract including fabrication drawings approved by the Department or their authorized representatives.

1.10.1 The contractor shall perform all tests and inspection necessary to ensure that the material and workmanship conform to the requirements of the contract including fabrication drawings approved by the Engineer or his authorized representative.

1.10.2 The Engineer or his authorized representative shall have access to the contractor's or sub-contractor's works at all reasonable time to determine

compliance with the provisions of this specification and /or to witness the contractor's inspection and tests.

- 1.10.3 All tests covered by this specification shall be subject to inspection and approval by the Mechanical/Fire system's engineer.
- 1.10.4 The contractor shall maintain records of all inspection works carried out in his works or in his sub-contractor's works. Copies of such records shall be made available to the client upon request and shall become the property of the Client. A procedure for the repair of defects shall submit to the Client for approval, prior to any repair modifications being made.

If the previous quality test and inspection are impaired by the subsequent repairs, the work shall be re-inspected and re-tested to the satisfaction of the Purchaser or his authorized representative. Equipment found unsatisfactory as to workmanship or material shall be removed by the contractor and replaced to the satisfaction of fire systems engineer at no extra cost.

- 1.10.5 All materials of components, castings, equipment, piping, instruments etc. shall be tested & inspected in the presence of the engineer or his authorized representative. Test certificates of all imported components shall be made available for approval of the Mechanical Engineer.
- 1.10.6 Final acceptance will be after the equipment is installed and tested at site to give satisfactory performance.
- 1.10.7 The Contractor shall provide the Mechanical/Fire systems engineer, necessary equipment and tooling instruments, drawings and personnel

etc. required for inspection of the work if applicable.

1.10.8 Strict measures of quality control shall be exercised throughout the work.

1.10.9 The contractor shall submit the following documents before acceptance six (6) sets.

- ❖ All the tests observations & calculation.
- ❖ All the operation & maintenance manuals.
- ❖ Leaflet & literature
- ❖ Test Certificate
- ❖ Guarantee Certificate
- ❖ Person to be contacted during Guarantee period.
- ❖ As-built drawings with soft copy.

1.11 TESTS AT SITE

1.11.1 During site fabrication, the pipe branches, elbows etc if any, shall be inspected and the joints and connections are to be checked before they are assembled in position. After assembly, the system shall be checked for leakage, vibration and noise.

1.11.2 After the complete erection of the system with all accessories are installed at site, these shall be tested as per applicable codes (unless otherwise specified) to check and assess their functional performance. The test to be conducted at site in the presence of the Mechanical/Fire system's engineer or his representative shall include but not limited to the following:

- (a) To check capability of fire hose reels, hydrants and fire extinguisher systems to deliver rated capacities after the installation.
- (b) To check proper and continuously reliable operation of the system

equipment & controls regulating the equipment for a period of minimum seventy two (72) hours, after the complete installation of system.

- (c) Leak testing of the pipework, fittings, connections etc. as/if applicable.
- (d) Any other tests as required to check compliance with specification and system requirements by statutory bodies, DPW and any other local authority for these systems in services.

1.11.3 All required instruments consumables and services for the above tests shall be provided by the contractor.

1.12 TESTING AND COMMISSIONING

Comprehensive pre-commissioning, commissioning as well as quality monitoring shall be done on all the fire systems including pipes and equipment. Commissioning shall be done in accordance with the supplier's recommendations as well as the standards including SANS 10287, ASIB, NFPA 13 and CIBSE code M section 8. Water loss must be kept to a minimum during construction and this will be achieved by using the water from the sprinkler system for facility works and irrigation when construction is complete. After completion of the contract, the contractor shall be required to provide training and system knowledge to the facility owner/manager by submitting documented design intent, As-built drawings, Operational and Maintenance Manuals as well as Commissioning Reports. In addition, the contractor shall provide training on all the systems to the facility owners' facility management staff. Full testing and commissioning procedures for individual equipment and for the entire systems shall be submitted.

Training provided must include:

- a) Review of controls set up, alarms and troubleshooting;
- b) Review of O&M manuals;
- c) Facility Operation (start up, normal operation, unoccupied operation, shutdown);
- d) Measures that can be taken to optimize energy efficiency;
- e) Occupational Health and Safety (OH&S) issues;

- f) Maintenance requirements and sourcing replacements; and
- g) Obtaining and addressing occupant satisfaction feedback.

1.13 SPARES AND TOOLS

1.13.1 Spares: The contractor shall offer a complete list of recommended spare parts for the equipment supplied along with the item wise costs for the three years satisfactory maintenance of the System.

1.13.2 Tools: All special tools required for operation and maintenance of the system shall be supplied by the contractor at agreed cost.

1.14 GUARANTEES

1.14.1 Equipment Guarantee: The contractor shall guarantee the trouble free & efficient performance of the System for design capacity. One year period (excluding shut down period due to fault) from date of acceptance will be treated as guarantee period. Contractor will have to attend all the faults and replace all material (including consumables) free of cost during guarantee period. Major equipment parts will have to be guaranteed for further one year, from the date of replacement. Any leakage of lubricants due to defective manufacturing or bad workmanship shall also be made good by the contractor free of charge.

1.14.2 The contractor shall further guarantee that the system for optimum operation.

1.14.3 No inspection & clearance either in verbal or written shall relieve contractor of his responsibility & guarantee.

1.15 TECHNICAL DATA

Technical data of all equipment shall be furnished as required.

1.16 AFTER SALES SERVICE

The contractor shall ensure adequate and prompt after sales service in the form of maintenance personnel and spares as and when required with a view to minimizing the break down period. Particular attention shall be given to ensure that all spares are easily available during the normal life of the system.

1.17 INSURERANCES

The bidder shall insure at his own cost all the men and materials during transit from his factory to the execution site till the systems are handed over to the client including damage done to others as per work order specification and Schedule of quantity, drawings. The most stringent shall only be followed.

SECTION 2 FIRE PROTECTION SPECIFICATION

2.1 FIRE EQUIPMENT INSTALLATION

Fire Hose-reels

The supply and installation of fire hose reels shall form part of this contract. Each hose reel will be of the manually operated type and consist of 30m of 20mm plastic hose complete with a 25 mm stop valve situated immediately below the hose reel. All fire hose reels shall be comprehensively serviced in compliance with SANS 1475-2, SANS 543:2004, relevant departmental specification and all other relevant specifications.

Fire Hydrants

The supply and installation of 65mm fire hydrants shall comply with relevant SANS standards local and international regulations.

Fire Extinguishers

<u>Location</u>	<u>Size</u>	<u>Type</u>
All areas	4.5kg	DCP
Service area	5 kg	Carbon dioxide

Fire extinguishers shall be supplied, installed/repaired/serviced and commissioned complete with mounting plates and mounted at 1500mm AFFL as shown in project drawings unless otherwise stated. All fire extinguishers shall comply with the relevant SANS code.

2.2 PIPEWORK

All above new ground pipework up to and including 150mm diameter, installed will be of Medium Quality Black Steel Piping to SABS 62/1971.

Pipework in excess of 150mm diameter will be of Medium Quality Black.

Piping to comply with SABS719 having a wall thickness of 6mm.

Any other forms of piping, i.e. Heavy Quality, Galvanised, Stainless Steel, etc. have not been included, unless stated within the covering letter to this quotation.

All above ground pipework up to and including 150mm diameter installed in normal pick able soil will be of either Medium Quality Black Piping to SABS 62/1971 bitumen coated as a protection against corrosion or uPVC piping to SABS 966. Pipework in excess of 150mm diameter will be of Medium Quality Black Piping to SABS719 bitumen coated as a protection against corrosion or uPVC piping to SABS 966. Denso wrapping of pipework has not been included, unless specifically stated within the covering letter to this quotation.

2.3 PIPE FITTINGS

Screwed pipe fittings up to and including 150mm diameter will be malleable cast iron to SABS 509/1975 or BS 143/1952.

Flanges up to and including 150mm diameter will be steel plate flanges to SABS 1123/1600/4 or BS 4505/16/4.

Welded pipe fittings up to and including 300mm diameter will be of steel butt-welded type to JIS B2304-72.

Weld flanges between 100mm and 300mm diameter will be steel plate flanges to SABS 1123/1600/3 or BS 4504/16/3.

Coupling type joints such as “Klambon” or “Victualic” will be used where deemed necessary.

2.4 WELDING

Welding will be to BS 2971 – Specification for Arch Welding of carbon steel pipework for carrying fluids without radiography and stress relieving.

2.5 HANGING MATERIAL

Purpose made pipe brackets in accordance with the requirements of the Fire Hoses-reels Inspection Bureau will be used in this project.

2.6 PAINTING

One coat of Red Oxide Primer shall be applied at the workshop prior to delivery to site followed by one finished coat of red gloss enamel to all exposed pipework only.

2.7 SIGNAGE

Firefighting equipment signage shall be installed in accordance of S.A.B.S.

2.8 WATER SUPPLIES

Water Supply to fill Tank. The water supply for the hydrants and hose reels will be from storage tank and will comprise booster connections for both fire hydrants and fire hose-reels.

2.9 SCHEDULES OF PARTICULARS AND INFORMATION

All schedules which accompany the mechanical work specification form an integral part of it and shall be duly completed in every detail: FAILING which, the tender in question may be rendered ineligible for consideration.

Under no circumstances will statements such as:

- ❖ See attached pamphlets

- ❖ Refer to catalogue
- ❖ Data to follow
- ❖ As given by the supplier, etc. be acceptable to the Department.

The principal contractor shall ensure that the equipment offered and listed on the schedules shall be capable of performing the specified duties and complying with the Specification requirements in all respects: SHOULD it transpire that such equipment, even when offered by make, model and/or type, is unsuitable or incapable of meeting, or performing in accordance with the specification requirements in any respect, the Principal Contractor shall nevertheless be responsible for any additional costs incurred in providing the required or suitable equipment.

Whenever a specific make, model or type of equipment has been prescribed in the specification and the tenderer offers an alternative or equal make or type of equipment in his tender, the Department will on acceptance of such a tender inform the prospective contractor in writing as to the make, and/or type of equipment accepted.

2.10 SERVICE/REPAIR PROCEDURE

2.10.1 FIRE HYDRANT

The norm is usually to provide 1 fire hydrant per 1000m² or part of total floor area and not less than one per storey of such facility or occupancy. Any fire hydrant required shall comply with the requirements contained in SANS 1128 Part 1.

The work under this Section includes providing all labor, materials, tools and equipment necessary for fire hydrants.

The following items shall be addressed

- ✓ hydrant leg,
- ✓ auxiliary gate valve
- ✓ Flush the hydrant
- ✓ Hydrant should be checked specifically for drainage.

Risk ASSESSMENT before service:

Before any service work is performed the following will be checked:

- ✓ Is there any electrical cabling running behind the equipment or close enough be effected by any water leak that may become apparent – Risk – Electrocutation.
- ✓ No service labels or seals shall be remove

2.10.2 FIRE HOSE REEL

Fire hose reel installed in any facility shall comply with the requirements contained in SANS543. The minimum diameter of any pipe providing water to the fire hose reel will not be less than 25mm in diameter. The fire hose reel will be robustly constructed and with brackets that will fix the hose reel against a wall. This hose reel rotates on a center pin that allows the user to unwind the fire hose reel unobstructed in case of a fire.

The standard dimensions and characteristics of a fire hose reel are as follows:

- ✚ The fire hose reel drum is 850mm in diameter
- ✚ A guide will prevent the fire hose reel from jamming
- ✚ The maximum length of a fire hose reel is 30m
- ✚ The diameter is 20mm

Fire Hose reels to meet the following specifications but not be limited to the following:

- ✓ Frame secured to the wall, and that means all mounting bolts.
- ✓ Arrow direction on the CP valve is pointing towards the reel
- ✓ Place a service label inside the reel close to the waterway
- ✓ Pressure test hose reel according to SANS 10105-Part 2
- ✓ Supply and install cabinets

NB* **SANS 10105-Part2**. Where a gauge is fitted, whether the water pressure to the hose reel and above-ground hydrant is at least 300Kpa. This at 300Kpa will deliver 0,5ltrs per second

At this stage it is important to remember the minimum delivery pressure for hose reel and hydrants is at 300Kpa, and where hose reel deliver 0,5ltrs per second. The hydrant delivers 20ltrs per second.

2.10.3 FIRE EXTINGUISHERS

Supply and Install fire extinguishers shall include, but not be limited to the following:

- a) Supply and Install wall mounting boards.
- b) Dry chemical powder extinguishers shall be
 - ✓ Extinguishers shall be labelled with identifying tags and details recorded, including service record.
- c) Carbon Dioxide extinguishers shall be repaired and serviced and shall include at least the following:
 - ✓ Extinguishers shall be labelled with identifying tags and details recorded, including service record.
 - ✓ New carbon dioxide fire extinguishers shall be supplied and installed in services area.

It is a standard practice to provide 2 x 4.5kg Dry Chemical Powder fire extinguishers with every 30m fire hose reel location. Dry Chemical Powder is a highly versatile Class 'A' 'B' and 'C' firefighting medium for dealing with electrical hazard, flammable liquids and gas fires.

Features:

- ✓ Multipurpose extinguisher
- ✓ Simple method of operation
- ✓ Unique tamper – evident safety pin
- ✓ Corrosion – resistant high quality durable finish
- ✓ Rapid flame knock-down is achieved
- ✓ Controlled discharge ensures firefighting efficiency

Any approved portable firefighting extinguisher shall comply with the requirements contained in SABS 890, 889 or SABS 1151 and shall be installed, maintained and serviced in accordance with SANS 0105.

2.10.4 FIRE SIGNS

Such signs are to be minimum size of 190 x 190mm and are to be SABS approved photo luminescent signs.

Every sign will be located and of such size, distinctive colour and design as to be readily visible. All signage must stand out from the surroundings and be visible.

Externally and internally illuminated signs will be visible in both the normal and emergency lighting mode. Every sign required will provide evenly illuminated letters having a minimum luminance of 0.21cd/m². Exit signs will be illuminated by the emergency lighting facilities

SECTION 3 FIRE DETECTION

3.1 SMOKE DETECTION – L1 SYSTEM

The smoke detection system will comply with SABS 0139. This system will be fully addressable and will include break glass units. The main smoke alarm panel will be located in a secure area and will be monitored 24/7. The system shall contain

- Optical smoke detectors
- Multicriteria detectors for kitchen (Where applicable)
- Ceiling void optical smoke detectors (where ceiling space height is equal to or greater than 800mm)
- Sounders and beacons

The proposed method of operation for the fire detection within the entire facility is based on a double knock system comprising of smoke detection / pressure switch / flow switch.

Each zone will be provided with intelligent mimic panels, sirens and manual call points. The number and positioning will be in accordance with SANS 0139 and the prescriptions of public works. The fire detection installation shall be linked via the facility management system to other services such as the air conditioning and speaker evacuation system

3.1.1 GENERAL SPECIFICATIONS OF SMOKE DETECTION SYSTEMS

CONTROL AND INDICATING EQUIPMENT

The Control Panel shall be of the Analogue Addressable type with built in power supply and complying with EN 54 part 2 and 4. The control and indicating equipment must have local support.

PRINTER

A printer shall be supplied with the control panel so that a permanent record of all events can be kept. The printer must be supplied by the manufacturer of the control and indicating equipment and be mounted in the control panel.

BATTERIES

The batteries that are supplied must be National Panasonic, Yuasa or Sonnenchein and be of the sealed lead acid type.

LOOP WIRING

All loops shall be Class "A" loops. Bridging of a loop in the Control Panel is forbidden as is running a spur from a loop. A spur is only allowed where detailed on the drawings.

LOOP ISOLATORS

A loop isolator shall be located at the beginning and end of every zone in order to minimize disruption of the loop in the event of a cable fault.

MANUAL CALL POINTS

All call points shall be surface mounted and where located outside a facility shall be of the weatherproof type. All call points shall be of the addressable type and be red in color.

DETECTORS

All detectors shall be of the addressable type and have an operational range of 20 square meters except for visual flame detectors. Detectors of the I.S. type shall be conventional. The ZENER BARRIER shall be suitable and installed as per the detector manufacturer's specifications. The client will provide a suitable high integrity earth. Alternatively a GALVANIC ISOLATOR may be used if recommended by the I.S. detector manufacturer. The Zener barrier or galvanic isolator must be located in a safe area and be housed in a suitable polycarbonate box. The Zener barrier must be mounted on din rail. The cabling to this unit must not be located on the same side of the housing.

ZONING

No zone shall exceed more than 2000m². Should there be any confusion, the engineer is to be consulted before work commences.

REMOTE POWER SUPPLIES

All remote power supplies shall be monitored for "mains fail" and "battery fail", by means of a contact monitoring device located on the loop. The circuit between the device and the contact in the power supply shall be a monitored circuit.

SOUNDER MODULES

These modules are an addressable device which shall be located adjacent to the remote power supplies. They shall have a 24vdc supply connected to them and provide power to a monitored sounder/strobe circuit in the event of an alarm.

AUDIBLE ALARMS

The type of audible alarm shall be the electronic sounder, and electronic sounder strobe type when used in noisy areas. The audible alarms shall be red in color and be manufactured from "Bay blend" fire retardant plastic. The sound shall be distinguishable from any other sound.

Sounders located outside of a facility shall be of the weatherproof type. As part the handover sound pressure testing will be carried out. The contractor must prove

that a minimum of 65db or 5db above the ambient noise level exists. The contractor shall provide a db meter for the testing. Test dates to be coordinated with the client.

VISUAL ALARMS

The frequency setting shall be from 500 to 1000Hz. The flash rate shall be from 30 to 130 flashes per minute. The flash rate shall be distinguishable from any other visual device. The visual alarms must be located so as to provide maximum visibility when operated. If there is any confusion the engineer must be contacted. The engineer's decision will be final. They shall be red in colour. Should the contractor be using a sounder/strobe other than the AST model, the contractor shall be responsible for the correct sizing of the cable.

CABLING

All cabling shall be installed in accordance with SANS 1042. Where cabling is to be installed underground, armoured cabling is to be installed. Should a loop go underground a 4core cable is not to be used. It must consist of 2 armoured cables each containing 2 cores. The size of a cable core must be a minimum of 1.5m².

Cable segregation must be observed, care must be taken not to locate fire detection cabling next to high voltage cables. It is compulsory for the contractor to confirm with the equipment manufacturer that the cable specified is suitable for the loop lengths and number of devices involved. Fire resistant cabling shall be used. FR 20 is unacceptable. All cabling is to be inside steel conduits. Cable of 2cl.0mm may be used where it can be shown not to exceed its specification. PH120 cable shall only be used for fire detection.

All cable inside facility must be housed in steel conduit to provide a neat appearance.

THE INSTALLATION

The installation shall be installed, tested and commissioned in accordance with SANS 10139. The installing technician will sign off his portion of the work. Upon

completion of the contract the installing company undertakes to service the system for 3 quarterly services and 1 complete service.

FIRE ESCAPE DOORS AND FIRE WALLS

All doors in the fire escape route shall be linked to the fire detection and system. If any one of the mentioned systems is actuated the fire escape doors shall remain in an open position and also have a fail open mechanism. All fire walls shall be rated for 60mins

SECTION 4 AUTOMATED VOICE EMERGENCY EVACUATION AND PUBLIC ADDRESS AND SYSTEM

4.1 SYSTEM OVERVIEW

This specification covers the work related to the installation of a voice evacuation speaker system.

The system shall comply with the SANS 60849, Specification for Sound Systems on Emergency Purposes and SABS 0139 specification for Fire Detection and Alarm Systems.

The contractor shall ensure that he is familiar with the layouts of other services, which will be installed in the facility. Before commencing installation work in any area he shall determine from the builder the routes and positions of pipes and ducts etc. for other services.

Should any problems occur in this regard, the subcontractor shall immediately inform the consulting engineer.

4.2 SCOPE OF WORKS

The scope of work to be carried out shall include but not be limited to the supply, installation, testing and commissioning and shall include the following items as detailed in the Bill of Quantities.

To supply, install, test and commission an Automated Voice Emergency Evacuation and Paging Installation including all cabling to the loudspeakers and associated equipment. All wire ways, conduits and 220vac power supplies to be provided by the electrical contractor.

The control room will house the front-end equipment for the system. A Fireman's Microphone with 20-button keypad will be installed in the Main Security room with a

remote Fireman's unit installed at the main entrance reception desk. All loudspeakers in the facility will be wired to the Main control room equipment rack with 1.00mm fire resistant type cable.

Loudspeakers will be located in specific areas as indicated on the tender drawings.

4.3 TECHNICAL REQUIREMENTS

For this specific application, a TOA System or equally approved is recommended.

4.4 DESIGN CRITERIA

Voice Alarm System - VAS

The system is designed for "Automated Voice Emergency Evacuation", paging included, BGM possible.

Fully integrated system, according to key element schedule, as listed earlier on.
Partially compliant to EN 54 -4, -16, -24 and/or SANS 7240 -4, -16, -24.

The "Automated Emergency Voice Evacuation System":

- to be a fully integrated voice alarm system,
- containing all components and features within one manufacturer's system,
- not relying onto other vendors' or manufacturers' devices
- in order to analyze and report on all safety features build-in as listed above,
- To be interconnected to a fire panel for receiving alarm signals relating to fire and evacuation signaling.
- A build-in protocol to be available to access the internally stored data from an external personal computer, such as status and system information, as well as control of the outputs and reading of the input.

4.5 SYSTEM DESCRIPTION

Sound pressure levels of speakers:

Tappings or envisaged wattage indicated, SPL at 1m distance.

Ceiling speakers: SPL [6W, 1m]: 90dB.

Horn speaker: SPL [10W, 1m]: 110dB.

Amplifier Wattage per Individual Zone:

The Emergency Voice Evacuation System is designed for 18 zones, of which its power requirements are satisfied by the respective amplifiers in the technical specification list at the end of this document, and leaving enough headroom for more speakers to come in the future, without exhausting the existing amplifier capacity.

Microphones:

The Fireman's Microphone shall be wall mounted as per instruction by the consulting engineer.

The Remote Microphone Console shall be desk mounted as per instruction by the consulting engineer.

Emergency Broadcasting:

Broadcasting automatically or manually. Individually per zone(s), or all-call. Broadcasting of pre-recorded emergency messages to occur not simultaneously but sequentially, first the evacuation message in the emergency zone(s), then following the alert message in the neighbouring zone(s).

Additionally, each broadcast may contain two or more messages, or an attention drawing signal first and then followed by an announcement, etc.

Standby Amplifier(s):

A total of two (2) standby amplifier is to be provided for.

The standby amplifier to take over the respective failing amplifier in the system.

Battery Backup:

The following rating has to be sufficed: 24 hours standby time plus a 30 minutes evacuation period under full speaker load.

A total capacity of 1200Ah at 24Vdc is required.

Above battery backup is required for the 'Automated Emergency Voice Evacuation System', including the fireman microphones and remote microphone consoles. Further, the emergency power supply with battery backup itself is powered via the general power grid. Correct circuit breaker rating to be considered and supplied.

Speaker/Amplifier Wiring:

Each operational amplifier for PA/Evac to provide mono line output speaker connection for A-wiring.

The speaker lines to utilize 100V line transformers.

Speakers and Cabling:

Above speakers to be assembled in accordance to EN 54 part 24 and BS 5839 part 8. Proof has to be presented in the tender document.

If the speakers are not equipped as per above EN54-24, the tenderer has to make the consultant aware of this fact, so it can be considered during adjudication.

Speaker wiring recommended to be minimal 1.0mm² in order to conduct as much amplifier power to the speakers for full sound volume and minimal loss of sound pressure level.

The Sound Pressure Level (SPL) in each zone shall be of good coverage and between +6 and +10 dB SPL above ambient noise. The design sheet provides further information regarding the tapping per each speaker, please adhere to this during installation.

Accessories:

Equipment rack with accessories, complete, to be provided, to house all head end equipment, battery backup, etc.

4.6 SUPPLY, DELIVERY, INSTALLATION, MAINTENANCE

Warranty and Support:

Local, South African warranty to be considered, when sourcing all items.

Commercial and technical support has to be available within South African borders.

Warranty has to be maintained for at least one (1) year after handover, plus technical support from the manufacturer to be available for at least the following ten (10) years.

The equipment and individual components shall be available from the manufacturer for at least ten (10) years, and spares and spare parts shall be available for at least seven (7) years after discontinuance of the product range.

Rack facility, setup, test, and commissioning:

The rack to be factory build, configured, setup and tested. Test certificate to be supplied.

Commissioning to happen on site, handover and commissioning certificate to be supplied.

Certification:

The head-end system has to be compliant and certified in accordance to EN 54 parts 4 and 16.

Certification has to be presented in the tender document.

If certification does not exist, the tenderer has to make the consultant aware of this fact, so it can be considered during adjudication.

LOUDSPEAKERS

Ceiling Mounted Speaker

6 Watt 5 inch Clip-in Ceiling Speaker supplied with Metal Back box, ceramic connector and 72 degree fuse (pre-assembled). As Per BS Standard Requirements.

Reflex Horn Speaker

100V line weatherproof, high efficiency horn speakers for outdoor use. Durable construction ensures long-term reliable operation. The speaker features a wide frequency response and high SPL (110db@1w / 1m). With aluminium horn and ABS driver housing this speaker are very rugged and produce a high quality sound. Thick stainless steel brackets ensure secure mounting. Rated input is 10w. Ideal for fire evacuation systems in offices. (BS features)

4.7 SUPERVISION

The system shall be fully supervised, from the microphone capsules right through the controllers, amplifiers and onto the speaker lines. Faults shall be reported within 100 seconds, allowing for a quick response to any cables being pulled out or other maintenance issues.

MESSAGES

The network controller shall include a flash card that is used for pre-recorded messages.

BACKGROUND MUSIC

The system shall include this feature. Selection of the background music and zones shall be done via the call station. Controlling of the music from another location, should only be possible by adding another call station to the system design.

INTERFACING

The system shall offer at least 28 control inputs that allow connection to third party products like, fire detection systems, etc.

The system shall also have at least 28 control outputs for interfacing with other products.

EVACUATION COMPLIANCE

The system range of equipment shall comply with the various emergency standards which are applicable all over the world. The network controller shall be capable of monitoring all the units in the system, from the microphone capsule of the call station to the loud speaker line. It shall have a built-in memory that stores the last 99 fault messages.

Any fault shall be reported back to the network controller, with details viewed on the LCD display of the network controller itself or on a PC connected to the network controller.

4.8 ELECTRICAL WORK

ELECTRIC RETICULATION

All electric reticulation between the front-end equipment and from it to the field devices shall be through a fire resistant cable and suppliers shall provide supporting documentation to this effect if requested to do so. Electric cable sizes and capacities shall be adequate to ensure that voltage drops due to reticulation distances will not impede the efficacy and full functionality of the voice evacuation system.

The cable wireways shall be provided by the electrical contractor as designed and specified by the electrical engineer.

4.9 SCHEDULES OF PARTICULARS AND INFORMATION

All schedules which accompany the mechanical work specification form an integral part of it and shall be duly completed in every detail: FAILING which, the tender in question may be rendered ineligible for consideration.

Under no circumstances will statements such as:

- See attached pamphlets

- Refer to catalogue
- Data to follow

The contractor shall ensure that the equipment offered and listed on the schedules shall be capable of performing the specified duties and complying with the Specification requirements in all respects: SHOULD it transpire that such equipment, even when offered by make, model and/or type, is unsuitable or incapable of meeting, or performing in accordance with the specification requirements in any respect, the Contractor shall nevertheless be responsible for any additional costs incurred in providing the required or suitable equipment.

AUTOMATED VOICE EMERGENCY EVACUATION AND PAGING INSTALLATION

ITEM	PARTICULARS	
1.	MULTIFUNCTIONAL 240W AMPLIFIER	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number	
(d)	Capacity sufficient for this facility (yes or no)	
2.	240W EXTENSION AMPLIFIER	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
(d)	Capacity	
3.	POWER AMPLIFIER 240W	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
(d)	Capacity	
4.	FIREMANS MICROPHONE	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
5.	CEILING MOUNTED SPEAKERS	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
6.	HORN TYPE SPEAKERS	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	

PARTICULARS OF THE SUBCONTRACTOR/SPECIALIST INSTALLER

NAME OF FIRM	
TENDERER'S SIGNATURE	
NAME (IN BLOCK LETTERS)	
ADDRESS	
DATE	
TELEPHONE No.	
CELL No.	
E-MAIL	
FAX No.	

SECTION 5 FIRE WATER AND ATANK SPECIFICATION

5.1 GENERAL

This standard specification deals only with the technical requirements for fire water and the tank and booster pumps

5.2 DESIGN OF FIRE WATER TANK AND PUMPING SYSTEM

The rules and regulations (latest edition) as laid down by the Automatic Sprinkler Inspection Bureau (“AS I B”), hereafter referred to as the “Rules”, and shall apply AND also as set out in the National Fire Protection Association (NFPA).

5.3 DIAMETERS OF WATER PIPES

The sizes of all distribution pipes shall be designed hydraulically in accordance with clause 2 above and according to the requirements of SANS 10400 Part T.

In the case of extra high hazard protection, the sizes of the branch pipes shall be determined in accordance with the applicable tables in the “Rules” unless specified otherwise in the Supplementary Specification. All pipe diameters are indicated on the specified drawings.

Contractors are to note that they are to tender strictly in accordance with the Engineer’s requirements.

5.4 DRAWINGS AND APPROVAL

A suitable layout for the required fire water pipework and pumping arrangement is indicated on the Engineer’s drawings. The tender drawings shall be returned with the tender and any deviations from the Engineer’s layout proposed by the contractor shall be indicated thereon in.

Contractors are to note that they are required to tender strictly in accordance with the layout of the Design engineer. In cases where air conditioning ducts, lights, etc., are being installed in the space to be protected, the successful contractor shall

consult the engineer for any information in this connection before completing his detailed shop drawings and installation.

Approval by the Engineer of the proposed detailed working drawings shall not reduce the contractor's responsibility in respect of the accuracy of his dimensions and the clashing of the system with other services or elements.

5.5 WATER SUPPLY

A single water supply shall feed a 288 000L water tank that shall consist of 2 booster pumps electric and diesel for fire water.

5.6 PRESSURE GAUGES

The pressure gauges required for the installation shall be not less than 100 mm diameter with porcelain faces registering 1 500 kPa. They shall be so connected to the control valves that one registers the pressure in the municipal supply and the other the pressure in the system.

Their connections shall be taken from purpose made outlets on the valves and shall comprise a "U" tube without any fittings (elbows etc.) with all bends neatly executed. The gauges shall be fitted upright with brass shut-off cocks or other approved means of shut-off so as to permit their removal under pressure, if required.

5.7 MATERIALS

All piping, fittings and valves used in the installation shall be new and of an approved type capable of withstanding a test pressure of 2 000 kPa. All piping shall be non-galvanised mild steel manufactured in accordance with SABS 62 (medium grade), unless otherwise specified and shall be of an approved brand and the best obtainable. All pipes shall be free of rust, flakes or other faults.

Notwithstanding the above stipulations, all underground pipes shall be galvanised in accordance with SABS 763.

PIPE JOINTS

All threaded pipe joints shall be made with an approved cold water pipe-jointing compound and flanges when used shall be bolted together with approved gaskets. Pipe threads shall be standard right-hand Whitworth. Mechanical pipe-joints i.e. “Klambon” or other pipe joints approved by the Engineer may be used provided they have been approved by the Automatic Sprinkler Inspection Bureau (A S I B) and are installed strictly in accordance with the instructions of the manufacturer.

WELDING

Welding in situ without the prior permission of the Engineer will not be permitted. If welding of any joint or joints is necessary on the site the reasons for this shall be clearly stated in the tender.

Welded joints shall be properly machined and the use of a welding torch for making holes shall not be permitted. Distribution pipes with welded crosses and tees shall be provided with female thread so that the branch pipes can be connected in the conventional way. Where pipe lengths exceed 14m they shall be fitted with flanges.

All welded joints shall be hydraulically tested to 2 000 kPa. Welded joints in branch pipes will not be permitted.

PREVENTION OF AIR LOCKS

In order to prevent the lodgement of air, a proper inclination of pipelines shall be maintained throughout the work.

SLEEVES AND PIPE SUPPORTS

Where sleeves and/or pipe supports are shown on the Engineer drawings, these will be provided by others. All pipe supports, clamps and other suspension fittings shall be supplied and installed by the sprinkler contractor. Distribution and branch pipes shall be properly secured and branch pipes shall be anchored within 0,7m from the last sprinkler head. The Contractor is required to provide a drawing showing full details of the sizes and manner of the suspension fittings, to the Engineer for its approval.

5.8 TESTING

The fire water installation shall be tested to a hydraulic pressure of 1 000 kPa and any defect made good.

PAINTING

Painting of all portions of the installation, including all hangers, valves and shall form part of the contract. Before painting is undertaken, all work shall be thoroughly cleaned of rust, scale, etc., by brushing with a stiff wire brush wherever necessary. A prime coat of high-quality zinc chromate primer shall be applied before delivery to the site. After installation, all fittings shall also be primed with zinc chromate primer and where the primer has come off the pipes, these shall be re-primed where after two coats of high gloss paint shall be applied. Unless otherwise specified, the colour of the high gloss paint shall be similar to No. D 30 Post Office red of CKS 279. The final coat of paint shall be applied only after the system has been tested and the ceilings have been painted. The final coat shall not be applied without the express consent of the Engineer. Pipe supports and other fittings, which are not directly in contact with the pipe work, shall be painted the same colour as the ceilings or beams. The Engineer is to be consulted in this regard.

5.9 OPERATING AND MAINTENANCE INSTRUCTIONS

Full installation operating and maintenance instructions shall be supplied in triplicate with each system and shall include schematics and detailed wiring drawings with a full component list indicating not only component values but sources of supply. Equipment will not be accepted until this information has been handed to the Engineer.

CUTTING OF PIPES

Contractors using conventional pipe cutters are warned that all burrs and lips are to be removed by proper reaming of the cut end before threading to ensure that the

original diameter is obtained. Any pipes with ends of reduced diameter found on the site shall be removed and the Contractor may be required to dismantle completed work so as to convince the Engineer that no such pipes were used elsewhere in the installation.

INSPECTION AND MAINTENANCE

Contractors shall provide and allow for a full inspection of the installation by the Automatic Sprinkler Inspection Bureau (A S I B) or any other organisation recommended or approved by the Engineer, before the date of the initial taking over of the system.

5.10 INFORMATION REQUIRED WITH TENDER

Contractors shall supply the information as requested in the Schedule of Equipment and Materials which is attached to this specification as an annexure, together with their tender. Should a Contractor fail to do so his tender may be disqualified.

5.11 FIRE TANK

The tank shall be made of sectional steel plates of 1,2m by 1,2 m robustly manufactured. Refer to tank design drawings for further details of the 288 000L water tank.

ANNEXURE B FIRE EQUIPMENT

ITEM	PARTICULARS	
1.	BOOSTER PUMPS	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number	
(d)	Capacity sufficient for this facility (yes or no)	
2.	STOP VALVES	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
(d)	Capacity	
3.	FIRE HOSE REELS	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
(d)	Capacity	
4.	FIRE HYDRANTS	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
5.	OPTICAL SMOKE DETECTOTS	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	
6.	CONTROL PANEL	
(a)	Manufacturer	
(b)	Country of origin	
(c)	Model number & size	

ANNEXURE C PARTICULARS OF THE SUBCONTRACTOR/SPECIALIST INSTALLER

NAME OF FIRM	
TENDERER'S SIGNATURE	
NAME (IN BLOCK LETTERS)	
ADDRESS	
DATE	
TELEPHONE No.	
CELL No.	
E-MAIL	
FAX No.	

ANNEXURE D-OHS SPECIFICATIONS

BASELINE RISK		HAZARD EFFECT / CONSEQUENCE				
MATRIX		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
Loss Type						
Timeline	No impact on overall project timeline	May result in overall project timeline overrun of less than 5%	May result in overall project timeline overrun of between 5% and less than 20%	May result in overall project timeline overrun of between 20% and less than 50%	May result in overall project timeline overrun of 50% or more	
Budget	No impact on the budget of the project	May result in overall project budget overrun of less than 5%	May result in overall project budget overrun of between 5% and less than 20%	May result in overall project budget overrun of between 20% and less than 50%	May result in overall project budget overrun of 50% or more	
Investment Return – NPV loss	Less than R5m	R5m to less than R50m	R50m to less than R500m	R500m to R5b	R5b or more	
Quality	No impact on quality	Minimal quality issues that can be addressed in a short timeframe with minimal interactions	Some quality issues that requires immediate management action	Significant quality issues that requires senior project management interaction	Significant quality issues that requires sponsorship intervention with significant resource and cost implications for rework	
Safety / Health	First aid case / Exposure to minor health risk	Medical treatment case / Exposure to major health risk	Lost time injury / Reversible impact on health	Single fatality or loss of quality of life / Irreversible impact on health	Multiple fatalities / Impact on health ultimately fatal	
Environment	Minimal environmental harm – L1 incident	Material environmental harm – L2 incident remediable short term	Serious environmental harm – L2 incident remediable within LOM	Major environmental harm – L2 incident remediable post LOM	Extreme environmental harm – L3 incident irreversible	
Legal & Regulatory	No legal impact	Minor legal concerns with minor impact	Some legal concerns with manageable level of impact	Serious legal concerns and significant impact on operations	Legal non-compliance with risk of shutdown of operations with significant cost impacts	
Reputation / Social / Community	Slight impact - public awareness may exist but no public concern	Limited impact - local public concern	Considerable impact - regional public concern	National impact - national public concern	International impact - international public attention	
LIKELIHOOD		RISK RATING				
5 Almost Certain	The unwanted event has occurred frequently; has a 90% and higher probability of reoccurring	11 Medium	16 Significant	20 Significant	23 High	25 High
4 Likely	The unwanted event has a probability of between 60% and less than 90% of occurring	7 Medium	12 Medium	17 Significant	21 High	24 High
3 Possible	The unwanted event has a probability of between 30% and less than 60% of occurring	4 Low	8 Medium	13 Significant	18 Significant	22 High
2 Unlikely	The unwanted event has a probability of between 1% and less than 30% of occurring	2 Low	5 Low	9 Medium	14 Significant	19 Significant
1 Rare	The unwanted event has never occurred, has a probability of less than 1% of occurring	1 Low	3 Low	6 Medium	10 Medium	15 Significant

BASELINE RISK ASSESSMENT

1 SOFTBALL STADIUM

NO	HAZARD/ITEM	RISK ASSOCIATED WITH HAZARD	CONSEQUENCES	RR	HOW IS HAZARD TO BE DEALT	BY WHOM	BY WHEN
1.	SITE ESTABLISHMENT						
	Incompetent persons Uncontrolled site establishment activities Incorrect stacking procedures	• Injuries during off loading • Cuts and burns • Rushed activities • Incorrect supervision • Management team not identifying existing services • Trip and fall • Cuts • Collapsing of stacks • Incorrect manual handling – back injuries	• Hand and back injuries • Dropping of equipment • Physical injuries • Incorrect manual handling • Potentially fatal accidents • Loss of limbs • Lost time injuries • Medical treatment cases	12	• The contractor must ensure that site is established at the correct location as identified by the Client. • Contractor OHS file must be approved prior to site establishment begins – aligned to New Construction Regulation 2014 • All workers on site must be declared medically fit by an Occupational Health Practitioner. (Annexure 3) • Site –induction must be given to all employees to make them aware of the specific hazards • The contractor must declare all employees competent in writing. • Before the commencement of this phase a site-specific risk assessment must be conducted by a competent risk assessor.	– Construction Supervisor – Contractor Safety Officer – Construction Supervisor	Before construction commences

					• All the employees involved must be inducted on the risks; proof of this would be signing off on these risks. • Site specific safe work procedures must be followed during these activities. • Relevant toolbox talks must also be held with employees. • The contractor must ensure that the correct serviceable tools are available during this phase. • Employees must be issued with correct PPE before works begin		
	Offloading heavy equipment and containers with mobile cranes.	• Defective mobile crane can cause accidents • Damage lifting tackle • Unsecure offloading area could cause accidents	• Serious injury and fatalities • Standing time • Lost time injuries • 1st Aid medical treatment cases	13	• All lifting equipment including the mobile crane must be checked before allowed on site. • Ensure that the correct mobile crane to be used for the offloading process. • Safe Working Load must be clearly displayed on the crane. • Load test certificate will be submitted to the client. • Rope and or sling certificates must be	– Construction Supervisor – Lifting tackle Inspector – Construction OHS officer	During site establishment

					- submitted to the client. • Only competent operators will be allowed to operate the mobile crane. • Daily checks as per checklist by operator. • Lifting tackle to be inspected daily. • Material to be stacked on firm and level ground. • Stacking to be supervised by a competent supervisor. • Adequate storage area to be provided • All unstable stacks to be dismantled and stacked over, in pre-determined area		
	Site security and fencing: – Fence with lockable gates – 24 security deployed – Fire prevention – All required OHS signage – Accommodation of offices	• Theft of property • Fires • Unsafe conduct by visitors	• Financial losses • Loss of equipment / documentation • Lost time due to theft • Production time lost • Injuries to visitors.	5	• All visitors must report to site office. • All visitors must also be inducted. • Checklist signed by supervisor and filed by safety officer	– Construction Supervisor. – Security	During Site Establishment
	Housekeeping:	• Inadequate storing facilities. • Damage to material and equipment. • Accumulation of waste.	• Serious injuries • Electrocutation • Environmental impact • Personal injuries • Lost time in production	9	• Use site establishment checklist to ensure compliance with all items • Toilet facilities & staff welfare as per Construction Reg 2014	– Construction Supervisor – Staff Welfare Inspector – Safety Officer – Qualified Electrician.	During Site Establishment

		• Environment pollution. • Facilities for employees. • Electrical installations	• Damage to equipment and material.		• Toilets 1:30(regular service) • Correct storing facilities for hazardous chemicals. • Correct signage for all storage of hazardous materials • Proper storing facilities for tool and equipment. • Adequate waste bins available. • Regular cleaning of these bins • Waste recycling is encouraged. • A COC certificate for temporary electrical installations by a register competent electrician.		
CIVIL WORKS:							
1.	Establish temporary parking area	• Offloading machinery could lead to damage to property and equipment • Falling machinery from low bed • Workers hit by machinery	• Serious injury • Fatality • Lost time injury • First aid treatment cases	21	• Method statement • Issue base risk assessments • Offloading procedures • Qualified operators • Check operator's medicals • Pre- start checklist • Supervision • Correct PPE	– Construction Supervisor – Construction OHS Officer	Before and during task
2.	Using motor grader; tlb; excavator; water truck; roller compactor; tipper trucks	• Employees hit with machinery • Breakdowns • Oil spillage • Poor workmanship	• Fatalities • Lost time injuries • Serious injuries • First aid treatment cases	21	• Method Statements • Issue base risk assessments • Induction all employees	– Construction Supervisor – Construction OHS Officer – Qualified operators.	Before and during task

		• Poor visibility due to dust	• Production time lost		• Medicals of operators • Qualified operators • Pre- start checklist of machinery • Identify lay-down area • Supervision		
3.	Soil Poisoning	• Using unregistered service providers • Using of unlicensed poisons • Using the wrong PPE	• Environmental damage • Soil pollution • Inhalation of harmful vapours • Injuries associated with poisons include eye/skin and inhalation	19	• This service provider must be inducted by the principal contractor. • Only competent and trained employees must be used. • MSDS must be available of the herbicides and pesticides at the first aid box • The correct PPE must be used • Risk assessment and method statements must be made available to the Construction Manager • Proper disposal of empty containers must apply. • All these employees do need valid medical certificates on annexure 3 format • Contractor must submit a basic OHS file for approval before work can commence. • The principal contractors and other contractors on site	– Construction Manager – OHS Officer – Supervisors and Health and Safety Reps	Before and during task

					must be inducted on the risk associated with poison.		
4.	Installation of drainage systems	• Trip and fall into excavations • Falling concrete pipes while offloading • Poor quality workmanship • Employees buried in trenches	• Fatalities • Serious injuries • Lost times injuries • Standing time due to poor workmanship and work to repeat.	19	• Method statements • Issue base risk assessments • Employees must be visible always • Direct supervision.	– Construction Supervisor – Construction OHS Officer – Qualified operators.	Before and during task
5.	Excavations and trenches	• Excavate with excavator to the specific level • Trip and fall • Collapsing soil • Machine struck employees • Hand injuries by excavation by hand • Incorrect manual handling	• Fatalities • Serious injuries • Lost times injuries • Accidents due to defective machines • Damaging services • Over excavation • Dust • Electrocution when damaging electrical services • Damage to services • Employees not visible to machine operator • Material falling in excavations while employees are working in excavations • Inadequate access and exit points • Employees may strain muscles to get into or out of excavations	13	• Method statements • Issue base risk assessments • Employees must be visible always • Direct supervision. • Well trained operators • Level on survey profiles clearly indicated • Proper communication between supervisor and operators • Induct employees on safe working procedures • All excavations must be inspected daily • Provide ladders ever 6 m for access in and out of excavations deeper than 1.5 m • Excavated material to be placed away from side of excavation • During excavation with machine no	– Construction Supervisor – Excavation Supervisor – Construction OHS Officer	Before and during task

					employees are allowed in the trench. • Sides of excavation to be shored (if necessary) and barricaded immediately • Excavations should be backfilled as soon as possible after excavation • Keep area barricaded with hard barricading until backfill is done.		
BUILDING WORKS							
1.	Excavation/ filling Trenches /Brick Work in foundations	• Hard rock material • Risk of collapsing excavations • Seepage of subterranean water • Employees inhaling dangerous fumes • Skin contact with hazardous substances(cement) • Man/machine interface • Slip/trip & fall risks • Brick falling into foundation due to poor stacking • Poor stacking practises	• Manual handling injuries • Lost time injuries • First aid treatments • Bruises to legs and feet	18	• Method statements • Issue base risk assessments • Inspections by excavation supervisor • Proper train operators • Location of services • Construction supervisor	- Construction supervisor - Construction OHS Officer - Excavation Supervisor - Civil Engineer - Hazardous Chemical Supervisor	Before and during task
2.	Reinforcing Concrete	• Filling material • Concrete dust inhalation • Skin irritation (dermatitis) • Unsecure retaining wall • Sharp edges	• Cuts; bruises; hand injuries due to steel work activities • Medical treatment cases • Serious injuries to back due to	13	• Quailed steel fixers • Induct workers on MSDS for concrete dust • Correct PPE for task • Correct gloves for steel fixing • Toolbox talks	- Construction supervisor - Construction OHS Officer - Excavation Supervisor - Hazardous Chemical Supervisor	Before and during task

			inadequate manual handling procedures • Lost time injuries • First aid treatment cases.		• Direct supervision • Correct tools for the task.		
3.	Formwork and Shuttering	• Concrete in contact with skin • Sharp edges could cut body parts • Heavy rebar could have potential back injuries	• Dermatitis • Lost time injuries	9	• Method statements • Issue base risk assessments • Toll box talks • Proper induction in task • Supervision	- Health and Safety representative - Construction Supervisor - Construction OHS officer	Before and during task
4.	Roof work	• Inadequate preparedness for type of equipment could lead to serious injuries and fatalities • Use of incorrect equipment could cause falls, falling objects • Defective equipment's could lead to collapsing of Struthers • Fragile objects • Overloading can lead to ropes 'slings snapping and cause damage and injuries to employees.	• Fatalities and major disabling • Standing /lost time injuries • Failure to establish safe work could lead to fatalities and serious injuries • First aid treatment injuries	18	• Method statements • Issue base risk assessments • Proper approved work platforms to work from. • Toll box talks • Inspect slings, chains, pulley's and hooks • Barricade working area (drop zone) • No employees under suspended load. • All employees working at heights must have medical for working at heights. • All employees working at heights need to have working at heights training • Fall protection plan written by a competent fall protection plan developer must be in place and inducted to	- Health and Safety Representatives - Construction Supervisor - Construction OHS Officer - Fall protection plan Implementer	Before and during task

					all employees working at heights.		
5.	Scaffolding Work	- Work At heights risks - Potential fall incidents - Falling equipment\Erection of scaffolds leading to potential fall injuries and potential fatalities - Scaffold collapse - Uneven surface - Insufficient / non - compliant scaffold - Insufficient scaffold components -	- Slip and fall while erecting scaffolding - Incompetent scaffolding Erector could cause the collapse of scaffolds while erecting the scaffolds. - Unsafe structures leading to falling from heights - Lost Time Injuries - Fatal injuries - Non- adherence to FPP could lead to major and serious injuries - Tools or material dropped unto persons working below - Damages to plant and equipment	17	• Operators are well trained and certified (Scaffold Erectors) • Using safety harnesses. • Work is adequately supervised (Scaffold Inspector) • Erectors are well trained and certified • No erecting scaffolds in wet weather or on wet ground • Compile Fall Protection Plan • FPP to be approved by client • Area is barricaded while dismantling or work above • Safety rails are present • Persons use lifeline (harnesses/fall rescue equipment) • Medicals for all people working at heights • Competent supervision of work • Employees are well trained to implement FPP • Tools/Material is kept in buckets • Good communication practices are always encouraged and enforced	- Site Supervisor - Team members - Safety Rep - Scaffold erector - Scaffold inspector - Scaffold Supervisor - Fall Protection Plan Developer	Before and During task Working at Heights

					• Head protection is compulsory (Correct PPE) • Scaffolding checked daily to a checklist. • Scaffolds completely checked after heavy rains or storm winds • Working on scaffold in bad weather is not allowed • Proper signage indicating safe or unsafe to used		
6.	External walling - Brick wall construction - Plastering + Painting of houses - Masonry work - Hollow walls - Face bricks	- Potential trip & fall incidents - Brick falling into due to poor stacking - Bruises to legs & feet - Poor stacking could lead to work to be re-done - Insufficient PPE - Paint particles in eyes - Skin irritation from paint - Paint spillage on property - Falling from heights	- Loss of production due to incident investigation - Lost time injury - Medical treatment cases - Back / body injuries - LTI - Medical treatment - Environmental damage from spillage - Project time and budget overrun	21	• Correct tools for job • Stack bricks not higher than pallets high • Correct PPE for handling bricks – sharp edges • Toolbox Talk • SWP • Qualified brick layers • Correct handling of bricks / concrete cement into foundation • Emergency escape drill (workers in trench) • All workers must wear PPE such as gloves, goggles, sus masks / respirator • Ensure to place a plastic cover on ground to prevent spillage Proper supervision from supervisor	- Site supervisor - Team members - Safety Rep	Before and During task

					• MSDS must always be available • Toolbox talks • Ensure workers are medically fit and trained to work at heights		
7.	Installation of Windows /doors Carpentry & Joining	• Use and hand tools that is damaged • Unskilled worker could damage glass	- Hand cuts could lead to first aid cases - Cost budget overrun - Lost time injuries	13	• Ensure tools and equipment is inspected before use • Correct PPE to be issued and used	- Site Supervisor - Team members - Safety Rep	Before and During task
8.	Internal work - Installation OF Doors - Installation of skirting	- Use of hand tools that is damaged - Manual handling injuries	- Hand injuries that could lead to 1st aid cases - Incorrect manual handling leading to injuries	10	• Use of correct PPE issued • Correct manual handling methods • Supervision	- Site Supervisor - Team members - Safety Rep	Before and During task
9.	Floor finishes - Installation Of tiles - Skirting - Plastering walls + paint	- Sharp edges of tiles could cut hands - Insufficient PPE - Paint particles in eyes - Skin irritation from paint - Paint spillage on property - Falling from heights	- Loss of production due to incident investigation - Lost time injury - Medical treatment cases - Back / body injuries - LTI - Medical treatment - Environmental damage from spillage - Project time and budget overrun	10	• Correct tools for job • Stack bricks not higher than pallets high • Correct PPE for handling bricks – sharp edges • Toolbox Talks • SWP • Qualified brick layers • Correct handling of bricks / concrete cement into foundation • Emergency escape drill (workers in trench) • All workers must wear PPE such as gloves, goggles, dust masks / respirator • Ensure to place a plastic cover on ground to prevent	• Site Supervisor • Safety Rep • Team • Working at Heights • Supervisor • Ladder Inspector	Before and During task

					spillage. Proper supervision from supervisor • MSDS must always be available • Toolbox talks • Ensure workers are medically fit and trained to work at heights		
10.	Ceilings - Install ceilings	- Cutting of steel branding – Hand Injuries - Electrocutation from power drill - Falling from ladder - Damage to equipment / property - Cutting of plasterboard using hack saw – Hand injuries	- Lost time injuries - 1st Aid Cases / Medical treatment - Serious injuries from falling - Back injuries from falling - Possibility of budget overrun on project - May result in project time overrun	18	• Ensure all workers are medically fit to work at height • Ensure all workers received working at heights training • Toolbox talk on ladder safety • Ensure measurements are correct • Ensure tools and equipment is inspected prior to use • All required PPE must be worn	- Site Supervisor - Safety Rep - Team - Working at Heights Supervisor - Ladder Inspector	Before and During task
11.	Electrical installations - External main power supply - Power supply to houses: Lights + Plugs	- Falling from ladder, back injuries - Hand injuries - Dust particles falling from roof, - Eye damage - Damage to cable if not done properly - Electrocutation - Falling of lights damage to property / assets - Fire from incompetent electrical when misconnecting cables etc.	- Lost time injury - 1st Aid Cases / Medical treatment - Serious injuries from falling - Back injuries from falling - Possibility of budget overrun on project - May result in project time overrun	13	• Ensure power is off and isolate • All workers must wear PPE to prevent injuries • Trained and qualified electrician to complete task • Proper supervision from Supervisor • Toolbox Talks to be conducted on electrical tasks • Always have a Fire extinguisher at job task	- Site Supervisor - Safety Rep - Team - Competent Electrician	Before and during task

					• All tools and equipment must be inspected • Fire extinguishers must be available and serviced • Proper supervision must be applied from Supervisor • Correct tools and equipment must be used • All workers must wear correct and enough PPE as required • Toolbox talk on Power tools • Ensure Electricity is isolated and locked out / switched off • Proper communication with the rest of the construction teams.		
12.	Plumbing works - All plumbing fittings, taps, basins	• Poor housekeeping • Falling of objects • Hand Injuries • Back Injuries • Strains • Damage to property / Equipment	• Loss time injuries • Medical Cases / 1st Aid Cases • May result in overall project overrun • Trip slip and falls	9	• Ensure measurements are correct • Supervisor to supervise • Proof of all workers medically fit • Ensure all workers are trained on the specific task to prevent damage • Toolbox talks to be held on job specific	- Site Supervisor - Safety Rep - Team - Competent Plumber	Before and During task
13.	Fire protection - Fire Extinguishers	• Inadequate and wrongly placed fire equipment can cause	• Lost time injury • Medical Cases / 1st Aid Cases	18	• Adequate fire equipment to be provided and placed at suitable location	- Construction Supervisor - Foreman - Fire Fighting Team - First Aider	Before and During task

		delay in dealing with fire should it occur - Poor housekeeping - Falling objects - Hand Injuries - Back Injuries - Strains - Non-availability of fire equipment's - Untrained personnel using wrong type of equipment to extinguish the fire - delays in searching for fire extinguisher - Fire alarm not functional or inaudible - Access blocked a people trapped inside; firefighting team not able to obtain access - Shortage or non-operation of firefighting equipment - Overcrowding an exit point during fire	- May result in overall project overrun - Trip slip and falls - Serious injuries or possible fatalities when fire gets out of control - Damage to property - Medical treatment - Bruises, cuts, broken limb 1st aid case treatment - Loss of life		- Monthly checklist of all fire equipment's - Provide training and have fire drills periodically - Store material in demarcated areas - Cigarettes to be extinguished properly and thrown into rubbish bins - Ashtrays and waste bins to be emptied daily - Fire escape routes and assembly points to be determined and clearly marked - All workers must use appropriate PPE, - Close supervision - Discuss risk assessment with workers - Induction training - Toolbox talks training	- Fire prevention supervisor	
14.	Electrical installation works	- Potential trip & fall incidents - Paving Brick falling onto due to poor stacking - Bruises to legs & feet - Poor stacking could lead to work to be re-done - Insufficient PPE - Paint particles in eyes - Skin irritation from paint - Paint spillage on property	- Loss of production due to incident investigation - Lost time injury - Medical treatment cases - Back / body injuries - LTI - Medical treatment - Environmental damage from spillage - Project time and budget overrun	14	- All tools and equipment must be inspected - Correct tools and equipment must be used - Registers to be signed off by competent supervisor - Employees must make use of issued PPE - Only a competent electrician must be used	- Construction Supervisor - Construction OHS Officer - Electrician	

		- Falling from heights - Back injuries due to heavy gate. Back injuries due to kerbing lifted incorrect method			Proper lock out procedure must in place during this activity		
WORKING AT HEIGHTS							
	Anny work on site where a possibility exists to fall from one level to another level	- Falling from a height this include ladders - Equipment and or tools falling from a height - Falling into an excavation	- Fatalities when falling from a height - Lost time injuries - Medical treatments - Damage to equipment and or tools	18	- A fall protection plan must be developed for all fall risks on site - Fall protection plan must be develop by a competent fall protection plan developer. - All the fall risk positions must have a proper risk assessment that must be inducted with the employees. - All employees working at heights must have the working at heights training. - All employees must have the appropriate medical certificates in place. - Correct tools and equipment must be used. - The correct fall protection PPE must be provided to the identified competent employees. - Employees need to be inducted of the risk associated with the activity	- Fall protection plan implementer - Construction supervisor - First aider - Safety officer	

					• Proper barricading around the working at heights site must be in place. • Enough working at heights working signs must be in place around the area. • All equipment and tools must be checked and place on a register. • Issued PPE must be inspected and signed off by a competent inspector.		
ERGONOMICS							
1.	All Construction work	• Repetition movements resulting in MSD'S • Grip force with hands, wrist, arms resulting in muscle fatigue and inflammation of the muscles and tendons • Lift /lower force activities that could result in lower back injuries • Working in awkward positions • Extreme temperatures • Activities that result in hand arm vibration that could result in MSD and white finger syndrome	• Lost time injury • Medical treatment incidents • Body injuries • Heat exhaustion	18	• Employees trained to recognise MSD symptoms • Encourage early reporting of MSD symptoms • Re-evaluate work procedures • Ensure regular resting periods • Employees need proper training in lifting practises • Job task observations • Mechanical lifting where possible • Redesigned tasks • Trained first aider • Enough freshwater hourly (600 ml)	- Construction Supervisor - Construction OHS Officer - All employees - First aider	Before and during task

				• Sunscreen should also be available • Equipment with lowest vibration be used • Proper maintenance schedules must be in place • Proper medical surveillance program in place • Vibrating reducing hand gloves must be used.		
--	--	--	--	--	--	--

POLOKWANE MUNICIPALITY

Coherent Health & Safety

Specifications



CONSTRUCTION: SOFTBALL STADIUM (PRELIMINARY)

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

FOREWORD

These health & safety specifications have been compiled in terms of the Occupational Health & Safety Act no. 85 of 1993 and Construction Regulations of 7 February 2014 as amended. It must be clear that this document is a management tool and should be used by the Principal Contractor and Contractors in order to comply with the Act and regulations.

Should there be any contradiction between this document and the Act; the Act must take preference except where explicitly stated.

Similarly, where this document is silent on a specific health & safety requirement, the Act must be used as the minimum requirement.

Should you be unclear about anything set out in this document, please contact this office. These specifications are site specific and include all works to be done by the principal contractor. The principal contractor will be responsible for all the work on site.

Every endeavour has been made to address the most critical aspects relating to Health and Safety issues in order to assist contractors in adequately providing for Health and Safety of employees on site. However, the Principal Contractor is required to ensure they stay compliant with statutory requirements and construction programs and processes and include such aspects in their Health and Safety file.

These health and safety specifications was prepared by H.Heyneke registered at the South African Council for the Project and Construction Management Professions (SACPCMP) as an Construction Health and Safety Manager (CHSM 162/2016) and Candidate Construction Health and Safety Agent (Can CHSA 146/2018)

No part of this document may be reproduced, transmitted, transcribed, and stored in a retrieval system in any form or by any means without written permission. Any unauthorised reproduction of this work will constitute a copyright infringement and render the perpetrator liable under both civil and criminal law.

This Health and Safety Specifications may not be used for a Construction Work Permit.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

COHERENT HEALTH AND SAFETY SPECIFICATIONS FOR SOFTBALL STADIUM

TABLE OF CONTENTS

- 1. Introduction and background**
 - 1.1 Background to the Health and Safety Specifications
 - 1.2 Responsibility and Accountability
 - 1.3 Purpose of the Health and Safety Specifications
 - 1.4 Implementation of the Health and Safety Specifications
- 2. Occupational Health & Safety Management System**
 - 2.1 Roles
 - 2.2 Implementation of the Health and Safety Specifications (Drafting of the coherent Health & Safety Plan)
- 3. Occupational Health & Safety management system elements**
 - 3.1 Scope of the Project
 - 3.2 The Extent of the works
 - 3.3 Interpretations
 - 3.3.1 Application
 - 3.3.2 Definitions
 - 3.4 Minimum Administrative Requirements
 - 3.4.1 Notification of Intention to Commence Construction Work
 - 3.4.2 Assignment of the Principal Contractor's / Contractors' Responsible Persons to Supervise and Co-ordinate Health and Safety on Site
 - 3.4.3 Competence of the Principal Contractor's / Contractors' Appointed Competent Persons
 - 3.4.4 Compensation for Occupational Injuries and Diseases Act 130 of 1993 (COIDA)
 - 3.4.5 Health and Safety Organogram
 - 3.4.6 Preliminary Hazard Identification and Risk Assessments, Progress Hazard Identification and Risk Assessments Reviews.
 - 3.4.7 General Record Keeping
 - 3.4.8 Injury / Incident Reporting and Investigation
 - 3.4.9 Consolidation of Health & Safety Documentation
 - 3.4.10 Offences and Penalties

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

- 3.5** Principal Contractors, Contractors and Sub-contractors
 - 3.5.1** Principal Contractor's and Contractors' Requirements
 - 3.5.2** Principal Contractor / Contractor Competency Assessment
 - 3.5.3** Pricing for Occupational Health & Safety Compliance
 - 3.5.4** Contractors' Coherent Health & Safety Plans [Construction Regulations 7]
 - 3.5.5** Communication and Management of the work
- 3.6** Polokwane Municipality identified Hazards and Potentially Hazardous Situations
 - 3.6.1** Unforeseeable Hazards
- 3.7** Site Operational Requirements
 - 3.7.1** Health and Safety Representative(s)
 - 3.7.2** Health and Safety Committees
 - 3.7.3** Health and Safety Training
 - 3.7.3.1** Induction
 - 3.7.3.2** Awareness
 - 3.7.3.3** Competence
 - 3.7.4** Health & Safety Audits, Monitoring and Reporting
 - 3.7.5** Emergency Procedures
 - 3.7.6** First Aid Boxes and First Aid Equipment
 - 3.7.7** Personal Protective Equipment (PPE) and Clothing
 - 3.7.8** Occupational Health and Safety (OHS) Signage
 - 3.7.9** Public and Site Visitor Health & Safety
 - 3.7.10** Access to Site
 - 3.7.11** Night Work (After Hours)
 - 3.7.12** Transport of Workers
 - 3.7.13** Construction Health & Safety Officer
- 3.8** Physical Requirements
 - 3.8.1** Earthworks (including Trenching and excavations)
 - 3.8.2** Edge Protection, Barricading and Penetrations (CR 10)
 - 3.8.3** Fall Protection – Fall Risk Positions (Construction regulation 10.)
 - 3.8.4** Deliveries, Waste Removal, Stacking/Storage of Materials
 - 3.8.5** Fire Extinguishers and Fire Fighting Equipment
 - 3.8.6** Traffic Control
- 3.9** Plant, Machinery and Equipment
 - 3.9.1** Construction Vehicles & Mobile Plant

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.9.2 Pressure Equipment

3.9.3 Hired Plant and Machinery

3.9.4 General Machinery

3.9.5 Electrical Installations and Portable Electrical Tools

3.9.6 Cranes and Lifting equipment

3.9.7 Scaffolding

3.10 Occupational Health

3.10.1 Industrial Hygiene (exposure to physical and chemical stress factors)

3.10.1.1 Noise

3.10.1.2 Ergonomics

3.10.2 Hazardous Chemical Substances (HCS)

3.10.3 Welfare Facilities

3.10.4 Alcohol and other Drugs

4. Omissions from the Site Specific Health and Safety Specifications

Annexure A

Primary Health & Safety Compliance

Annexure B

Principal Contractor and Contractors' Responsible Persons

Annexure C

General Compliance Requirements

Annexure D

Occupational Health & Safety – Health & Safety pricing guidelines

Annexure E

Occupational Health & Safety File Index

Annexure F

Notification of Construction work

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

1. INTRODUCTION AND BACKGROUND

1.1 Background to the Health and Safety Specifications

The Construction Regulations (February 2014) places the onus on the Polokwane Municipality to prepare coherent health & safety specifications, highlighting risks not successfully eliminated during design. The Polokwane Municipality also has the opportunity to set the tone and standard of occupational health & safety on the construction site.

1.2 Responsibility and Accountability

It is imperative to understand the process of determining legal accountability, as the OHS-Act is the only criminal Act still administered by the Department of Labour. It *assumes* that the CEO is overall accountable even though he may delegate some of his responsibilities. This principal is entrenched in Section 37(1) of the Act. This is generally referred to as the REASONABLE MAN TEST. SECTION 37: Acts or omissions by employees or Mandataries

1.3 Purpose of the Health and Safety Specifications

The purpose of this specification document is to provide the relevant Principal Contractor (and sub-contractor) with any information other than the standard conditions pertaining to construction sites which might affect the health and safety of persons at work and of persons in connection with the use of plant and machinery during Construction work.

1.4 Implementation of the Health and Safety Specifications

To brief the Principle and Sub Contractor on the significant health and safety requirements and aspects of the project. This shall include the provision of the following information and requirements namely:

- a) *safety considerations affecting the site of the project and its environment;*
- b) *health and safety aspects of the associated structures and equipment;*
- c) *required submissions on health and safety matters from the Principal Contractor (and Sub Contractor);*
- d) *the Principal Contractor's (Sub - Contractors) health and safety plan.*

To serve to ensure that the Principal Contractor (and Sub Contractors) is fully aware of what is expected from them with regards to the Occupational Health and Safety Act, 85 of 1993 and the Regulations made there-under including the applicable safety standards, and in particular in terms of Section 8 and 44 of the Act.

To inform the Principal Contractor that the Occupational Health and Safety Act, 85 of 1993 in its entirety shall apply to the contract to which this specification document applies. The Construction Regulations promulgated on 7 February 2014 and incorporated into the above Act by Government Notice R 84, published in Government Gazette 37305 shall specifically apply to all persons involved in the construction work pertaining to this project.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

“Purpose of the Act” –To provide for the health and safety of persons at work and the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

“Agent” –means a competent person who acts as a representative for a Polokwane Municipality;

“Client” –means any person for whom construction work is performed;

“Construction manager” means a competent person responsible for the management of the physical construction processes and the coordination, administration and management of resources on a construction site;

“Construction site” means a work place where construction work is being performed;

“Construction supervisor” means a competent person responsible for supervising construction activities on a construction site;

“Construction work” means any work in connection with –

- a) The construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure; or 6
- b) The construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work;

“Contractor” means an employer who performs construction work;

“Designer” means-

- a) A competent person who-
Prepares a design;
Checks and approves a design;
Arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the employer; or
Designs temporary work, including its components;
- b) An architect or engineer contributing to, or having overall responsibility for a design;
- c) A building services engineer designing details for fixed plant;
- d) A surveyor specifying articles or drawing up specifications;
- e) A contractor carrying out design work as part of a design and building project; or an interior designer, shop-fitter or landscape architect;

“Health and Safety File” –means a file, or other record containing the information by the Construction Regulations;

“Health and Safety Plan” –means a site, activity or project specific documented plan in accordance with the Polokwane Municipality’s health and safety specification;

“Health and Safety Specification” –means a site, activity or project specific document prepared by the Polokwane Municipality pertaining to all health and safety requirements related to construction work;

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

"Method Statement" –means a document detailing the key activities to be performed in order to reduce as reasonably as practicable the hazards identified in any risk assessment;

"Principal contractor" means an employer appointed by the Polokwane Municipality to perform construction work;

"Risk Assessment" –means a program to determine any risk associated with any hazard at a construction site, in order to identify the steps needed to be taken to remove, reduce or control such hazard.

1.5 Abbreviations:

GMR: General Machinery Regulations

OHS Act: Occupational Health & Safety Act. Act 85 of 1993

Constr Reg: Construction Regulation 2014

ORHVS: Operating Regulations for High Voltage Systems

PPE: Personal Protective Equipment

2. OCCUPATIONAL HEALTH & SAFETY MANAGEMENT

2.1 ROLES

Polokwane Municipality/ Agent

- a) Prepare a baseline risk assessment and issue a health and safety specification to the Principal Contractor, Designer and include the specification in tender documentation.
- b) The Polokwane Municipality or the appointed Polokwane Municipality Agent will appoint each Principal Contractor for this project or phase/section of the project in writing for assuming the role of Principal Contractor as intended by the Construction Regulations.
- c) The Polokwane Municipality or the appointed Polokwane Municipality Agent shall discuss, negotiate and approve the contents of the specified project health and safety plan submitted by the Principal and Sub Contractor.
- d) The Polokwane Municipality or his Agent will take reasonable steps to ensure that the health and safety plan of the Principle and Sub Contractor is correctly implemented and maintained. Monthly audits shall be conducted to monitor the compliance.
- e) In the event of design changes the Polokwane Municipality or the appointed Agent on his behalf will ensure that enough resources will be provided to implement the work safely.
- f) The Polokwane Municipality or his appointed Agent on his behalf, will prevent the Principal Contractor and/or the Contractor from commencing or continuing with construction work should the Principal Contractor and/or the Contractor at any stage in the execution of the works be found to:

have failed to have complied with any of the administrative measures required by the Construction Regulations in preparation for the construction project or any physical preparations necessary in terms of the Act;

have failed to implement or maintain their health and safety plan;

have executed construction work which is not in accordance with their health and safety plan;

have acted in any way which may pose a threat to the health and safety of any person(s) present on the site of the works or in its vicinity, irrespective

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

of him/them being employed or legitimately on the site of the works or in its vicinity.

Designer

- Must take into account the health and safety specifications of the Polokwane Municipality.
- Before the tender process, the designer must make available a report to the Polokwane Municipality about :
 - All the relevant health and safety information about the design of the relevant structure that might affect the pricing of the construction work.
 - The geotechnical –science aspects, where appropriate.
 - The loading that the structure is design to withstand.
- Inform the Polokwane Municipality in writing of any known or anticipated dangers or hazards related to the project.
- Make available all relevant information required for the safe execution of the work upon being designed or when the design is subsequently altered.
- During the design take into account the hazards relating to any subsequent maintenance to be performed with the minimum risk.
- During the design stage cognizance of ergonomic design principals must be applied in order to minimize ergonomic related hazards in all phases of the life cycle of a structure.

2.2 Implementation of the Health and Safety Specifications (Drafting of the coherent Health & Safety Plan)

These health & safety specifications document forms an integral part of the contract, and the Principal Contractor is expected to use it when compiling its project-specific coherent health & safety plan. The Principal Contractor must forward a copy of these specifications to all Contractors at their bidding stage so that they can in turn prepare coherent health & safety plans relating to their operations.

3. OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM ELEMENTS

3.1 Scope of the Project

These Specifications set out the requirements for eliminating or if this is not possible, for minimising as far as reasonably practicable, the risk of incidents and injuries occurring at Polokwane Municipality. **This document covers work to be undertaken of the project and sets out the rules and procedures for engagement on the project.** The scope also addresses legal compliance, Polokwane Municipality standards, hazard identification and risk assessment, risk control, and the promotion of a health and safety culture amongst those working on the project. The health & safety specifications also make provision for the protection of those persons other employees

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.2 The Extent of the works:

The proposed scope of work will entail the supply of material and construction of the following:

Associated Facilities & infrastructure for the whole stadium

- Grandstand Building (with facilities for visiting and home teams, administration, media, VIP, storage, ancillary spaces, ramps, staircases, part circulation spaces and ablutions.
- Ablution facilities for all Fields (A, B, C and practice field) located in the Grand stand Building
- Electrical, Mechanical and Fire prevention works.
- Sewer collection and reticulation works, water supply and reticulation works.
- Roadwork's for entry and exit to site, internal and circulation road works and parking.
- Public plaza works.
- Landscaping to spaces around the Grand Stand, Stand B and the public plaza.
- Secured Kids Play Area

2. Main Field A

- Field A Grand Stand with roof (3500 seating)
- Field A, 6260m² (International Standard) with netting and safety requirements as per manual
- Earth Berm (Future seating), Dugouts, Bullpens and batting cages
- Lighting and electronic requirements as per client specification

3. Field B

- Field B (Area 6260m²) (International Standard)
- Field B seating Stand (1000 spectators)
- Earth Berm, Steel Structure Pavilion, Bullpens and batting cages
- Lighting and electronic requirements as per client specification
- Field C
- Field C (Area 6260m²) prepared for match standards and conditions.

4. Practice Field

- Open grassed area practice field of area 8250m² (75m x 110m).

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.3 Interpretations

3.3.1 Application

This specifications document is a legal compliance document compiled in terms of the OHS Act & Construction Regulations 2014 and is therefore binding. The document must be read in conjunction with other relevant legislation.

3.3.2 Definitions

The definitions as listed in the OHS Act 85/1993 and Construction Regulations (February 2014) shall apply.

3.4 Minimum Administrative Requirements

3.4.1 Notification of Intention to Commence Construction Work

The Principal Contractor must notify the Provincial Director of the Department of Labour in writing before construction work commences. A copy of this notification must be held in the Principal Contractor's health & safety file on site. The fax transmission slip will serve as proof of notification.

See attached **Annexure "F"**

3.4.2 Assignment of the Principal Contractor's / Contractors' Responsible Persons to Supervise and Co-ordinate Health and Safety on Site

The Principal Contractor and all Contractors must make supervisory appointments as well as other relevant appointments in writing (as stipulated by the OHS Act and Construction Regulations 2014). See attached **Annexure 'B'** for more detail on what health & safety management appointments are relevant on this project.

3.4.3 Competence of the Principal Contractor's / Contractors' Appointed Competent Persons

The Principal Contractor and Contractors' competent persons for the various risk management portfolios must fulfil the criteria as stipulated in terms of the definition 'Competent' in accordance with the Construction Regulations (February 2014).

3.4.4 Compensation for Occupational Injuries and Diseases Act 130 of 1993 (COIDA)

The Principal Contractor must have in its possession a letter of good standing issued by its Compensation Assuror as proof of registration. Contractors must also hold proof of workman's compensation assurance registration in the form of a letter of good standing and forward a copy to the Principal Contractor before they begin work on site. Contractors must be in good standing at all times while carrying out work on site.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.4.5 Health and Safety Organogram

Including all appointed risk management competent persons. In cases where appointments have not yet been made, the organogram shall reflect the intended positions.

The organogram must be updated when there are changes in the Site Management Structure, and dated accordingly. The organogram merely serves as a quick reference to who is responsible for what risk portfolio in what area.

3.4.6 Preliminary Hazard Identification and Risk Assessments, Progress Hazard Identification and Risk Assessments Reviews.

The Principal Contractor must cause preliminary hazard identification and risk assessment to be performed under the leadership of a competent person before commencement of construction work. On this project detailed task-specific risk assessments based on the proposed sequence of work (method of work) must be compiled. Generic risk assessments will not be accepted.

The assessed risks, together with written safe work procedures for the 'medium & high-risk' rated activities must form part of the coherent site specific health and safety plan submitted for approval by House of Safety. The risk assessments must include:

- a) A list of hazards identified as well as potentially hazardous tasks;
- b) The risks which may result based on the list of hazards and tasks;
- c) A set of safe work procedures to be implemented with the aim of eliminating or if this is not possible, reducing and/or controlling the risks as far as reasonably practicable to ALARP (as low as reasonably practicable);
- d) A monitoring and review procedure of the risk assessments as they change i.e. how will the risk assessments be reviewed, when will they be reviewed and by whom.

The Principal Contractor must ensure that all Contractors inform, instruct and train their workers regarding any hazards, the associated risks and the related safe work procedures to be implemented before any work commences and thereafter at regular intervals as the risks change and as new risks develop. This training should be carried out in the form of toolbox health & safety talks. Contractors must conduct their own toolbox talks and submit proof of these talks in the form of attendance registers to the Principal Contractor at least every two weeks. Every worker on site must undergo such toolbox safety talks with the attendance registers kept in the Principal Contractor's safety file.

Contractors must conduct their own hazard identifications and risk assessments specific to their operations and forward a copy to the Principal Contractor.

The Principal Contractor when required must report on the status of these Contractor risk assessments to the Polokwane Municipality i.e. at audits.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.4.7 General Record Keeping

The Principal Contractor and all Contractors must keep and maintain all the necessary Health and Safety records to demonstrate compliance with these Coherent Specifications, the OHS Act 85/1993, and the Construction Regulations (February 2014). The Principal Contractor must also ensure that all records of incidents/injuries, emergency procedures, training, planned maintenance inspections, monthly contractor audits, etc. are kept in the health & safety file(s) held in the site office. The Principal Contractor must ensure that every Contractor keeps its own health & safety file, maintains the file and makes it available on request (the file must include the Contractor's health & safety plan and all relevant records). Such 'Contractor safety files' must be audited by the Principal Contractor on a monthly basis with audit reports kept as proof.

3.4.8 Injury / Incident Reporting and Investigation

Injuries are to be categorised into first aid; medical; disabling (lost day); and fatal. When reporting injuries to the Polokwane Municipality, these categories must be used. The Principal Contractor must investigate all injuries. All Contractors must report injuries to the Principal Contractor immediately and the Principal Contractor must inform the Polokwane Municipality immediately. All incidents reportable in terms of the provisions of Section 24 of the OHS Act must be reported to the local Dept. of Labour in the prescribed manner.

3.4.9 Consolidation of Health & Safety Documentation

It is the duty of the Principal Contractor to ensure that all documentation required to be kept or generated during the construction phase is consolidated into one set of documents that must be handed over to the Polokwane Municipality upon completion of the construction work. This consolidated safety file(s) should include instructions from the design team that will be required for the continued safe operation and maintenance of the new structure(s).

3.4.10 Offences and Penalties

Penalties may be imposed on the Principal Contractor and Contractors for ongoing non-compliance with the provisions of the Polokwane Municipality's coherent health & safety specifications, the Principal Contractor's coherent health & safety plan, site health & safety procedures and rules. Non-compliances identified during safety agent audits and visits will be categorised into one of three levels based on severity. These will be as follows: Life threatening situation - a prohibition order will be issued by means of a written instruction in the site instruction book or an explanation in an audit report. This activity must be seized immediately and corrective measures taken. Serious injury possible – a contravention notice will be issued with a time frame for compliance stipulated. Minor or no injury may result – an improvement notice will be issued. The corrective measures stipulated in the audit report must be taken. The methodology used to decide the above levels will be directly linked to the risk assessments of the Principal Contractor and contractors, Polokwane Municipality Standards. The decision of the safety Agent will be final.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.5 Principal Contractors, Contractors and Sub-contractors

3.5.1 Principal Contractor's and Contractors' Requirements

The Principal Contractor must ensure that all Contractors appointed by them comply with these Specifications, the Principal coherent health & safety plan as well as the OHS Act, Construction Regulations (February 2014), and other relevant legislation that may relate to the activities directly or indirectly. A Contractor, when appointing other Contractors as 'Sub-contractors', shall mutatis mutandis ensure compliance as if it was the Principal Contractor.

The Principal Contractor may only allow a Contractor to begin work on site after receiving a coherent health & safety plan which must include a project specific hazard identification, risk assessments and safety measures. The Principal Contractor must test competency and finally approve his sub – contractor coherent site specific health and safety plan. The Principal Contractor must audit each of its contractors on a monthly basis, with audit reports kept in the health & safety file on site. The audit must include an administrative assessment as well as a physical inspection of the contractor's site activities. *The Principal Contractor must stop any Contractor from carrying out construction work that is not in accordance with the Principal Contractor's and/or Contractor's health & safety plan or if there is an immediate threat to the health and safety of persons.*

The Principal Contractor shall take all reasonable steps necessary to ensure co-operation between all contractors to enable each of those contractors to comply with the provisions of the Construction Regulations;

The Principal Contractor shall take all reasonable steps to ensure that each contractor's coherent health and safety plan is implemented and maintained on the construction site: Provided that the steps taken shall include periodic audits at intervals mutually agreed upon between the Principal Contractor and contractors, but at least once every month;

The Principal Contractor must ensure that where changes are brought about to the design and construction, that sufficient health and safety information and appropriate resources are made available to contractors so as to allow them to execute the work safely;

The Principal Contractor must ensure that every contractor is registered and in good standing with a recognised compensation fund or with a licensed compensation insurer prior to work commencing on site;

The Principal Contractor must ensure that potential contractors submitting tenders have made provision for the cost of health and safety measures during the construction process;

The Principal Contractor shall discuss and negotiate with the contractor the contents of the coherent health and safety plan and shall finally approve that plan for implementation;

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

The Principal Contractor shall hand over a consolidated health and safety file to the Polokwane Municipality upon completion of the construction work and shall include a record of all drawings, designs, materials used and other similar information concerning the completed structure;

The Principal Contractor may only appoint a contractor to perform construction work when such Principal Contractor is reasonably satisfied that the contractor he or she intends to appoint, has the necessary competencies and resources to perform the construction work safely and that the contractor is an approved Polokwane Municipality contractor.

3.5.2 Principal Contractor / Contractor Competency Assessment

The Principal Contractor must be reasonably satisfied that the contractors it intends to appoint have the necessary competencies and resources to safely conduct the work they will be appointed for. This should be established at tender stage and before appointments are made. One of the preferred ways of determining whether a contractor is competent is to make sure the contractor is an accredited contractor for Polokwane Municipality. Once the contractor is appointed, but before it begins work on site a site- specific safety plan must be discussed and negotiated with the Principal Contractor. Such safety plan must be approved for implementation by the Principal Contractor.

The Principal Contractor and Contractors should submit the following documentation for perusal and verification by the Polokwane Municipality and Principal Contractor respectively:

- Coherent health & safety plan as compiled for this project; (including Risk assessments, safe work procedures, fall protection plan, PTW Issuer/PTW Holder certificates
- Management Structure as envisaged at tender (organogram);
- Letter of Good Standing with the Compensation Commissioner or FEM;
- Proof of health & safety training and other related training; (CV and certificates) Legislative appointment letters
- Notification of Construction work; (proof notification was done)

3.5.3 Pricing for Occupational Health & Safety Compliance All parties bidding to do work on this construction project must ensure that they have made provision for the cost of complying with this Specifications document as well as with the OHS Act and incorporated Regulations as a minimum requirement in their tender documentation. It must also be taken into consideration that time is money, which implies that sufficient time must be allowed for the implementation of the minimum OHS standards. No additional claims will be entertained at a later stage should a compliance requirement be prescribed in the OHS Act, incorporated regulations or in this Specifications document.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.5.4 Contractors' Coherent Health & Safety Plans [Construction Regulations 7]

1. Introduction:

The Construction Regulations (2014) aims to improve overall management and co-ordination of Health, Safety and Welfare throughout the Construction Phase and reduce the large number of serious and fatal injuries and cases of ill health, which occur every year in the Construction Industry.

In terms of the Construction Regulations (2014), the Principal Contractor is required to develop a Health and Safety Plan before work commences on site and review it throughout the Construction Phase. The degree of detail required in the Health and Safety Plan and the time and effort in preparing it should be in proportion to the nature, size and level of Health and Safety risks involved in the project. Projects involving minimal risks will call for simple, straightforward plans. Large projects or those involving significant risks such as this project will need much more detail.

2. What should the construction health & safety plan cover?

The Construction Health and Safety Plan should set out the arrangements for ensuring the Health and Safety of everyone carrying out the construction work as well as all other persons who may be affected by it. The index of this plan must be in line with Annexure:

3.5.5 Communication and Management of the work

The Principal Contractor must indicate in its health and safety management plan that it has made provision for the following:

- a. Management structure and responsibilities
- b. Health and Safety goals for the project and arrangements for monitoring and review of Health and Safety performance i.e. safety meetings; contractor meetings; risk assessment review, etc
- c. Arrangement for:
 - i. Regular liaison between parties on site i.e. meetings
 - ii. Consultation with the work force i.e. toolbox talks
 - iii. The exchange of design information between the Polokwane Municipality, designers, and Contractors on site
 - iv. Selection and control of Contractors i.e. selection criteria; inspections; audits, etc.
 - v. Site health & safety induction and onsite training i.e. toolbox talks
 - vi. Welfare facilities, first aid, emergency planning and fire prevention strategy
 - vii. The reporting and investigation of injuries and incidents including near misses what the intended system will be
 - viii. The production, approval and review of risk assessments, safe work procedures and method statements and how does the company's risk assessment system work.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

d. Site specific rules and procedures.

3.6 Polokwane Municipality identified Hazards and Potentially Hazardous Situations

See attachment.

Other possible risks you need to consider.

1. Existing services
2. Interface with the public
3. Hazardous chemical such as solvents, cleaning agents, cement, fuels, oils, epoxies, etc.
4. Site security and access control issues
5. Relocation and protection of existing services
6. Finishing trades

3.6.1 Unforeseeable Hazards

The Principal Contractor must immediately notify Contractors as well as the Polokwane Municipality, in writing, of any hazardous or potentially hazardous situations that may arise during the performance of construction activities so that the necessary precautions may be taken before such work begins.

3.7 Site Operational Requirements

3.7.1 Health and Safety Representative(s)

The Principal Contractor and all Contractors must ensure that Health and Safety Representative(s) are appointed under consultation with the employees. The H&S representatives must be competent to carry out their functions. The appointments must be in writing. The Health and Safety Representatives should carry out monthly inspections, keep records of the inspections and report all findings to the Responsible Person or safety officer forthwith and at monthly health & safety committee meetings. At least one Health & safety representatives is required by all Employers on site.

3.7.2 Health and Safety Committees

The Principal Contractor must ensure that project health and safety committee meetings are held monthly with minutes kept. Meetings must be chaired by the Principal Contractor's Responsible Person [CR 7(1) person]. All Contractors' Responsible Persons and Health & Safety Representatives must attend the Principal Contractor's monthly health & safety meetings. The Principal Contractor's appointed supervisors must also attend health & safety meetings. The following topics must be tabled at meetings: management appointments and risk management portfolios; sub-contractor legal compliance issues; injuries and incidents; hazards and risk assessments (present and foreseen); safety procedures; method statements for upcoming activities; planned inspections and registers/record keeping, etc. The committee chairperson must sign off and date the minutes.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.7.3 Health and Safety Training

3.7.3.1 Induction

The Principal Contractor must ensure that all site personnel including all sub-contractors undergo the agreed health & safety induction training session held and managed by the P/Contractor before any worker starts work on the project. A record of attendance must be kept in the health & safety file. Workers must carry proof of inductions on their person while on site i.e. identification passport cards or similar to be agreed.

3.7.3.2 Awareness

The Principal Contractor must ensure that, on site, periodic toolbox health & safety talks take place at least once every two weeks. All site personnel including all sub-contractors must attend safety talks at such intervals and keep proof thereof. These talks should deal with risks relevant to the construction work at hand i.e. they should be based on the job-specific risk assessments and safe work procedures. Records of attendance must be kept in the P/contractor's health & safety file. All contractors' employees must attend safety awareness toolbox talks carried out by their supervisors, the attendance registers must be copied to the Principal Contractor together with information on the information discussed at the session.

3.7.3.3 Competence

All competent persons must have the knowledge, experience, training, and qualifications specific to the work they have been appointed to supervise, control and/or carry out. This must be assessed on a regular basis e.g. training, evaluation, and periodic audits by the Polokwane Municipality, progress meetings, etc. The Principal Contractor is responsible to ensure that Competent Contractors are appointed to carry out construction work on site.

3.7.4 Health & Safety Audits, Monitoring and Reporting

The Principal Contractor is obligated to conduct monthly audits on all Contractors appointed by it and keep audit reports in its health & safety file. Contractors have to audit their sub-contractors and keep records of these audits in *their* health & safety files, made available on request. The Polokwane Municipality/Agent will conduct monthly audits on the Principal Contractors' safety management plan.

3.7.5 Emergency Procedures

The procedure must detail the response procedures including the following key elements:

List of key competent personnel;

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

Details of emergency services;
 Actions or steps to be taken in the event of the specific types of emergencies;
 Evacuation procedures: including routes and exits to be available on a drawing.
 Emergency procedure(s) must include, but shall not be limited to: fire; spills; injury to employees; damage to material / equipment / plant; use of hazardous substances; bomb threats; major incidents/injuries; evacuation; etc. The Principal Contractor must advise the Polokwane Municipality in writing forthwith, of any emergency situations, together with a record of action taken/action to be taken. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and made available to site personnel. The emergency plan will need to be reviewed from time to time as conditions/environment changes i.e. as building work increases in extent.

3.7.6 First Aid Boxes and First Aid Equipment

The Principal Contractor and all Contractors must appoint First Aider(s) in writing. The Principal Contractor must appoint at least one First Aider to start with, which first aider must be certificated. Copies of valid certificates are to be kept on site. The Principal Contractor must provide at least 1 (one) first aid box, adequately stocked at all times. Due to the nature of this project i.e. satellite work stations/areas, further first aid boxes must be provided close to the various work stations to allow for quick, effective treatment of injured persons. As the work progresses and the structure increases in height, extra first aid

3.7.7 Personal Protective Equipment (PPE) and Clothing

The Contractor must ensure that all site workers are issued with and wear the appropriate PPE as indicated in their risk assessments. The Contractors must make provision and keep adequate quantities of SANS approved PPE on site at all times according to their risk assessments. Safety harnesses are mandatory wherever work takes place in an elevated area where safe working platforms or ladders are not possible. Overalls clearly indicating the Contractor's logo must be worn and all sub-contractors must conform to this requirement. Eye protection must be worn by those working grinders, skill saws, and high pressure water cleaners. Even those workers in close proximity to these operations will also be required to wear such eye protection.

Safe footwear will be required by all workers. A high visibility vest is mandatory on a Polokwane Municipality site.

3.7.8 Occupational Health and Safety (OHS) Signage

The Principal Contractor must provide adequate on-site OHS signage. Including but not limited to: 'construction work - no unauthorised entry', 'beware of overhead work', 'hard hat area', first aid – to be posted up at all work areas/zones.

Signage must also be posted up at strategic locations to warn the public of diversions, alternative through ways and other irregularities caused by construction work (pedestrians and motorists).

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

Signs are also required as per law e.g. scaffolding and other potential risk areas/operations such as exposed edges and openings and trenches/excavations where persons are at work. Safety signs and awareness posters will also be required in strategic locations on site such as frequently used access routes, stairways and entrances to structures and buildings where the workers will continuously be made aware of health & safety. Health & safety signage must be well maintained including weekly inspections, cleaning, replacement and repair.

3.7.9 Public and Site Visitor Health & Safety

Public walkways and roadways must be kept clean and free of construction materials so as to prevent any negative impact on the public. Public roadways and walkways will have to be cleaned on a regular basis – daily inspections to be conducted by the Principal Contractor with action to be taken without delay (daily).

Site visitors must be briefed on the hazards they may be exposed to as well as what measures are in place or should be taken to control these hazards. The Construction Regulations require that a record of these 'inductions' be kept on site. It is advised that a visitor book with site rules leaflet be kept at the reception/site office and all visitors to be directed to such point where they must read through the site safety information and sign the visitor book. It will be the Principal Contractor's prerogative to decide whether site visitors require supervision while on site. Visitor hard hats must be kept in the site office.

3.7.10 Access to Site

Where any permits are necessary from the local authorities, this will be the Principal Contractor's responsibility. The road surface of all public and private roadways and pavements/pedestrian walkways must remain in a reasonably clean state, free of excessive sand, stone, water or other construction related materials. The access gate(s) must be controlled and visitors must sign in and report to the site office for further instruction.

3.7.11 Night Work (After Hours)

No night work will be allowed within the hazardous zone on this project without prior approval from the Polokwane Municipality/Polokwane Municipality's Agent and the Construction Health and Safety Agent.

3.7.12 Transport of Workers

The Principal Contractor and other Contractors may not transport: Persons together with goods or tools unless there is an appropriate area or section to store the tools or equipment; Contractors must adhere to the National Road Traffic Act.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.7.13 Construction Health & Safety Officer

A full-time construction officer (in terms of Construction Regulation 8) will be required on this project. The construction officer will be required to carry out at least the following duties:

- a) Health & safety audits and inspections on site including administrative and Physical audits of all Contractors' health & safety plans, files and activities, and record findings in the form of audit reports to be kept in the health & safety file; b) Assess, and finally approve contractor safety plans;

3.8 Physical Requirements

3.8.1 Earthworks (including Trenching and excavations)

The Principal Contractor and relevant Contractors must make provision in their tender for the shoring of excavations where the soil conditions warrant it or if this is not possible cut it back -excavation walls must be battered back to a safe angle, termed the safe angle of repose.

The Principal Contractor has the following options: first option is to shore or brace the excavation, should this not be practical then such excavation must be battered back to the safe angle of repose (second option). Should the first two options not be deemed necessary by the Contractor, then permission must be given in writing by the appointed competent excavation supervisor (third option). Where uncertainty pertaining to the stability of the soil exists, the decision of a professional engineer or professional technologist competent in excavations shall be decisive. Such permission must be in writing.

The following is relevant to excavations:

- Excavations/trenches are inspected before every shift and a record of these inspections is kept;
- Safe work procedures have been communicated to the workers;
- The safe work procedures are enforced and maintained by the Principal Contractor's and Contractors' responsible persons at all times;
- Excavations next to permanent or temporary roadways - ensure that no load, material, plant or equipment is placed or moved near the edge of any excavation where it is likely to cause its collapse and thereby endangering the safety of any person, unless precautions such as the provision of sufficient and suitable shoring or bracing are taken to prevent the sides from collapsing;
- Ensure that where the stability of an adjoining building, structure or road is likely to be affected by the making of an excavation, steps are taken that may be necessary to ensure the stability of such building, structure or road as well as the safety of persons
- Cause convenient and safe means of access to be provided into every excavation in which persons are required to work and such access shall not be further than 6m from the point where any worker within the excavation is working;

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

- Ascertain as far as is reasonably practicable, the location and nature of electricity, water, gas or other similar services which may in any way be affected by the work to be performed. The necessary steps must then be taken to render the circumstances safe for all persons involved;
- Cause every excavation which is accessible to the public or which is adjacent to public roads or thoroughfares, or where the safety of persons may be endangered, to be
- Adequately protected by a barrier or fence of at least one meter in height and as close to the excavation as is practicable; and provided with warning illuminates or any other clearly visible boundary indicators at night or when visibility is poor;
- Cause warning signs to be positioned next to an excavation within which persons are working or carrying out inspections or tests

3.8.2 Edge Protection, Barricading and Penetrations (CR 10)

A Contractor must ensure that—

- All unprotected openings in floors, edges, slabs, hatchways and stairways are adequately guarded, fenced or barricaded or that similar means are used to safeguard any person from falling through such openings;
- No person is required to work in a fall risk position, unless such work is performed safely as contemplated in sub-regulation (2);
- A detailed Fall Arrest and Rescue Plan will be drafted and implemented on site.
- The above mentioned plan will be demonstrated on instruction of the Polokwane Municipality's Agent.

3.8.3 Fall Protection – Fall Risk Positions (Construction regulation 10.)

A Contractor must—

- Designate a competent person to be responsible for the preparation of a fall protection plan; ensure that the fall protection plan contemplated in paragraph (a) is implemented, amended where and when necessary and maintained as required; and take steps to ensure continued adherence to the fall protection plan.
- A fall protection plan contemplated in sub regulation (1), must include—
 - A Risk Assessment of all work carried out from a fall risk position and the procedures and methods used to address all the risks identified per location;
 - The processes for the evaluation of the employees' medical fitness necessary to work at a fall risk position and the records thereof;
 - A program for the training of employees working from a fall risk position and the records thereof;
 - The procedure addressing the inspection, testing and maintenance of all fall protection equipment; and
 - A rescue plan detailing the necessary procedure, personnel and suitable equipment required to affect a rescue of a person in the event of a fall incident to ensure that the rescue procedure is implemented immediately following the incident.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

A Contractor must ensure that a construction manager appointed under regulation 10(1) is in possession of the most recently updated version of the Fall and Rescue Protection Plan.

Fall prevention and fall arrest equipment are —

- Approved as suitable and of sufficient strength for the purpose for which they are being used, having regard to the work being carried out and the load, including any person, they are intended to bear; and
- Securely attached to a structure or plant, and the structure or plant and the means of attachment thereto is suitable and of sufficient strength and stability for the purpose of safely supporting the equipment and any person who could fall; and
- Fall arrest equipment is used only where it is not reasonably practicable to use fall prevention equipment.

Fall Elimination –

The first step in work at height control is to assess the workplace and the work itself in the earliest design/ engineering stages of the project/ site and during the planned stages of all work so that potential fall hazards can be eliminated at an early stage. By doing so employees are not exposed to these potential fall hazards at any stage and work can be conducted with little exposure to fall risks and hazards.

The benefit of identifying these hazards allows for them to be included in the building phase of the job so that prevention measures are included during the construction and maintenance processes involved in the project.

Fall Prevention –

The second outlook is to assess the scope of work and potential conditions using collective protective measures. If fall hazards cannot be completely eliminated during the first step, management must take a proactive approach to the prevention of falls by improving the workplace and its conditions. In this step any hazards that arise outside of the design phase of a project are identified. This is achieved by assessing the work place and its conditions using a work at height risk assessment with the idea of implementing fall prevention measures such as guardrails, edge protection, hand rails and so forth. In this way all hazards that were not dealt with in the design phase can be addressed and a safe working environment will be achieved through the implementation of these systems.

Fall Arrest –

This is the last resort in preventing falls and individual prevention measures are assessed and implemented. In this step the condition or type of work conducted at height cannot be addressed at a design level or prevention level. In this step preventing the employee from hitting the ground is the aim, whereby systems and fall arrest equipment are used to prevent this from occurring. Equipment such as harnesses, lanyards, shock absorbers, fall

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

arresters, lifelines, anchorage points, and safety nets can reduce the risk of injury if a fall occurs.

Life lines –

- The lifeline shall be of no less than 12.5 millimetres steel cable, able to withstand a 2.250 kg drop maintains tensile strength integrity of the material. Where steel cable cannot be used adequate lifelines in the form of ropes are to be used in accordance with manufacturing specifications able to support the above mentioned force. If a fall is expected while attached to lifeline, that line shall be replaced.
- The lifeline shall be installed in a length not to exceed 60 meters. The lifeline ends should be attached in such a manner that the ends are wrapped around a fixture so that it is facing the work area. As it is wrapped, a softener shall be installed to keep the cable from being marred or kinked.
- The cable shall be wrapped no less than one complete wrap around a beam or fixture and secured with no less than three (3) cable clamps of suitable strength. It shall be pulled to at least 45 torque kilograms.
- During installation, and as the cable is passed through each bay, it shall be attached/ supported in increments of no more than 15 meter runs. To maintain the intended height and elevate sag, the supporting material must be affixed in such a manner to be immobile.
- The supporting material must be of at least 75 x 75 mm angle iron/ steel. Holes may be tapped through the material as long as it is evenly centred, and the inside diameter edges are smooth and rounded.
- When working on elevation where there is no means for overhead attachment, supporting material shall be attached from the same elevation in an upright manner and attached.

Safety Harnesses

- Engineering contractor and all contractors/ subcontractors will provide full body harnesses meeting SABS standards. Safety belts are not allowed for fall protection.
- Standard full body harnesses are not designed for a combined personnel and tool weight in excess of 137 kg. Personnel weight more than 137 kg, with tools, must consult project/ site SHE coordinator prior to using fall arresting equipment
- All Safety harnesses are to be stored in cool dry areas and inspected on a monthly basis. Any cuts, snags abrasions are to be reported to the site supervisor and the harness discarded immediately
- Harnesses and lanyards must be checked for the following, but this the check points are not limited to this list:
- Beginning at one end, 15 cm to 20 cm of the harness/ lanyard must be bent into a U shape. This helps reveal worn, cut, frayed, burned, or damaged fibres. Both splices and all straps along the entire length must be checked.
- Webbing must be carefully checked at attachment points to buckles and “D” rings.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

- The shock-absorbing section of the lanyard must be checked for ripped stitches.
- The harness/ lanyard must be checked for broken/ frayed strands.
- Checks for rough, sharp edges; corrosion; dents or distortion; freely moving parts.

3.8.4 Deliveries, Waste Removal, Stacking/Storage of Materials

The Principal Contractor and other relevant contractors must ensure that there is an appointed stacking supervisor and all materials, formwork and all equipment is stacked and stored safely, on level, compact ground, out of access ways and no more than three times the minimum base width in height. Pallets of bricks may not be stacked more than two above each other and must be on timber pallets. No construction materials or equipment may be stacked or stored in public areas unless authorised by the Polokwane Municipality and fenced off as per the Polokwane Municipality's requirements. Waste materials must be kept within designated construction zones. The Principal Contractor will be responsible for co-ordinating and managing this function.

3.8.5 Fire Extinguishers and Fire Fighting Equipment

The Principal Contractor and relevant Contractors shall provide adequate, regularly serviced firefighting equipment located at strategic points on site, specific to the classes of fire likely to occur. The appropriate notices and signs must be posted up as required. A minimum of four 9 kg dry chemical powder fire extinguishers must be available in and around the site office establishment and stores. Fire extinguishers must also be placed at all work zones/areas, in strategic locations. Wherever *'hot work' is taking place, additional fire extinguishers must be on hand. Contractors are responsible for ensuring compliance with hot work procedures and must be in possession of method statements detailing the safe working procedures. *'Hot work' includes all work that generates a spark or flame and may therefore result in a fire.

Further, during the finishing stages of the construction phase when the finishing trades are on site, fire extinguishers will be required at strategic locations within the work areas – to be supplied and managed by the Principal Contractor.

3.8.6 Traffic Control

The Principal Contractor shall ensure that a fulltime traffic safety officer be appointed in writing, upon the commencement of construction activities. The traffic safety officer shall be tasked with regular inspections and movement of road traffic signs as per the approved traffic accommodation plans and will report to the safety officer.

This document must indicate the potential risk to the public or environment posed by all vehicles travelling to and from the areas of construction for the purpose of the construction work, and proposes methods to eradicate or minimise these risks. Such a plan must include the following aspects:

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

- Design of Traffic Management Plan
- Site specific base line risk assessment
- Protection of employees
- Protection of pedestrians
- Specific signage and distances applicable
- Applicable training
- Appointments of road safety officers
- Management after hours/weekend/adverse weather conditions
- Setup and clearing of signage

The Principal Contractor will also put in place flagmen to control the entry and exit of vehicles to and from the site onto the public road.

3.9 Plant, Machinery and Equipment

3.9.1 Construction Vehicles & Mobile Plant

“Construction Plant” includes all types of plant including but not limited to, cranes, piling rigs, excavators, construction vehicles, compaction plant, batch plants and lifting equipment.

The Principal Contractor must ensure that such plant complies with the requirements of the OHS Act, Construction Regulations (Feb 2014) and any manufacturers specifications. The Principal Contractor and all relevant contractors must inspect and keep records of inspections on construction vehicles and mobile plant used on site. Only authorised/competent persons in the possession of the necessary training certificates and in possession of a certificate of medical fitness may operate construction vehicles and mobile plant.

Appropriate PPE and clothing must be provided and maintained in good condition at all times.

Reverse alarms must be installed on construction vehicles i.e. trucks, digger loaders, etc.

Vehicles and pedestrian traffic must be safely separated, preventing any unnecessary interfacing.

Any vehicle or mobile plant using any public road must be roadworthy and carry a certificate proving this. Likewise any operator of such construction vehicle or mobile plant will have to carry the necessary driver's license.

3.9.2 Pressure Equipment

The Principal Contractor and all relevant Contractors must comply with the Pressure Equipment Regulations, including:

Providing competency and awareness training to the operators/users;
Providing the relevant PPE and clothing;

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

Inspecting equipment regularly (every 3 months) and keeping records of these inspections;

Providing appropriate firefighting equipment (Fire Extinguishers) on hand;

Ensuring that oxygen and acetylene bottles are secured in an upright position, do not show signs of corrosion or damage and have flash back arrestors fitted on both torch & bottle ends of hoses.

3.9.3 Hired Plant and Machinery

The Principal Contractor must ensure that any hired plant and machinery used on site is safe for use and complies with the minimum legislated requirements. The necessary requirements as stipulated by the OHS Act and Construction Regulations shall apply. The Principal Contractor shall ensure that operators hired with machinery are competent and that competency and medical certificates are kept on site in the health & safety file. Any load test requirements and inspections in terms of legislation must be complied with and copies of load test certificates and inspections must be kept in the health & safety file. All relevant contractors

3.9.4 General Machinery

The Principal Contractor and relevant contractors must ensure compliance with the Driven Machinery Regulations, which includes carrying out risk assessments on the machines, inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE and relevant clothing, and training those who use machinery.

3.9.5 Electrical Installations and Portable Electrical Tools

The Polokwane Municipality will ensure as far as possible that the Principal Contractor is made aware of the positions of all electrical power lines. The Principal Contractor must notify the Polokwane Municipality should it not be sure of the location of any electrical power lines.

The Principal Contractor must comply with the Electrical Installation Regulations, the Electrical Machinery Regulations and the Construction Regulations (CR 24).

The Principal Contractor must keep a copy of the Certificate of Compliance (CoC) for its temporary electrical power supply. A revised CoC is required whenever the installation is altered or changed in any way. All temporary electrical installations must be inspected at least weekly by a competent person appointed in writing with records kept. Portable electrical tools and equipment must be visually inspected daily with records kept. It is advised that the P/Contractor appoints the electrical contractor to inspect the temporary electrical installation on a weekly basis with feedback given in a report so that any maintenance and repairs can be undertaken. Such appointed inspector must 'stop' or isolate any distribution board that is unsafe for use.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

3.9.6 Cranes and Lifting equipment

Cranes and Lifting equipment will comply with OHS Act 85 of 1993, Driven Machinery Regulations (DMR) 18. Operators of mobile cranes must be in the possession of a valid PDP licence, medical certificate and training certificate. Mobile cranes must have a valid load test certificate and must be inspected monthly by a competent person on register. All lifting equipment / tackle must have a valid load test certificate and will be inspected monthly by a competent person on register. At no stage will gas cylinders be lifted by a crane unless the cylinders are in a cradle designed to carry equipment. Cranes will be directed by a Banks man / Supervisor with sufficient communication with the crane. It will remain the responsibility of the operator to ensure that the loads are not slewed over other employees and that the mobile crane slew is barricaded with tape while the crane is in operation. Where there is a Life Threatening Fault, the Crane Operations will not start until the faults have been sufficiently repaired and the Crane was issued with a certificate to prove the crane has been fixed and where applicable, a new load test was conducted.

3.9.7 Scaffolding

No Contractor will allow any employee to work on unsafe or damaged scaffolding. Scaffolding will be inspected daily and after inclement weather by a competent appointed person.

No work will be allowed on scaffolds during inclement weather conditions.

Scaffolds will be fitted with a sign at the access to the Scaffold to indicate if it is safe or unsafe to use. Scaffolds will be constructed to SANS 10085 standards and OHS Act 85 of 1993 regulations.

3.10 Occupational Health

3.10.1 Industrial Hygiene (exposure to physical and chemical stress factors)

Exposure of workers to occupational health hazards and risks is very common in any work environment, especially in construction. Occupational exposure is a major problem and all Contractors must ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards. Prevent inhalation, ingestion, and adsorption through the skin of hazardous chemical substances.

3.10.1.1 Noise induced hearing loss is a highly underrated occupational condition. Occupational noise emitted by construction machinery and power tools must be controlled as far as possible by implementing engineering solutions such as noise dampening, regular maintenance, servicing and inspection, screening off the noise, and reducing the number of persons exposed. Personal protective equipment such as earmuffs and earplugs must also be used in conjunction with engineering controls so as to reduce noise exposure to below the acceptable levels.

3.10.1.2 Ergonomics is the study of how workers relate to their workstations. We advise the Principal Contractor and Contractors to take this into

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

consideration when conducting risk assessments, thereby improving the worker-task relationship, which will in turn improve productivity and reduce chronic conditions such as back strains, joint problems and mental fatigue, amongst others.

3.10.2 Hazardous Chemical Substances (HCS)

The Principal Contractor and other relevant contractors must provide the necessary training and information as far as the use, transport, and storage of HCS. The Principal Contractor must ensure that the use, transport, and storage of HCS are carried out as prescribed in the HCS Regulations. The Principal Contractor and contractors must ensure that all hazardous chemicals on site have Material Safety Data Sheets (MSDS) on site and the users are made aware of the hazards and precautions that need to be taken when using the chemicals. The First Aiders must be made aware of the MSDS's and how to treat HCS incidents appropriately. Copies of the MSDS's must be kept in the first aid box and in the store. All containers must be clearly labelled. Flammable substances must be stored separately, away from other materials, and in a well-ventilated area (appropriate cross ventilation). A competent person should be appointed to be in control of this portfolio. Stores must be well ventilated, preventing the build-up of flammable and toxic gases/vapours. Should fuel storage containers be used, they must conform to the general environmental legislation and Environmental Management Plan (if a requirement on this site). The necessary safety signage must to be posted up – 'no naked flames', 'no smoking'. Two 9 kg DCP fire extinguishers must be placed near to the fuel containers, but not within 5 m of the containers. These extinguishers are over and above the minimum four required for the offices and stores.

3.10.3 Welfare Facilities

The Principal Contractor must supply sufficient toilets (1 toilet per 30 workers), clean, lockable changing facilities, hand washing facilities, soap, toilet paper, and hand drying material. Waste bins must be strategically placed around site and emptied regularly. Workers must not be exposed to hazardous materials/substances while eating and must be provided with adequate, sheltered eating areas complete with benches and tables. Stores may not double up a change rooms or mess areas.

3.10.4 Alcohol and other Drugs

No alcohol and/or other drugs will be allowed on site. No person may be under the influence of alcohol or any other drugs while on the construction site. Any person on prescription medication must inform his/her superior, who shall in turn report this to the Principal Contractor forthwith. Any person suffering from any illness/condition that may have a negative effect on his/her /anyone else's health or safety performance must report this to his/her superior, who shall in turn report this to the Principal Contractor forthwith. Any person suspected of being under the influence of alcohol or other drugs must be sent home immediately, to report back the next day for a preliminary inquiry. The

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

Contractor concerned must follow a full disciplinary procedure and a copy of the disciplinary action must be forwarded to the Principal Contractor for its records.

4 Omissions from the Site Specific Health and Safety Specifications

Every endeavor has been made to address the most critical aspects relating to Health and Safety issues in order to assist the contractor in adequately providing for the Health and Safety of employees on site. However, the Principal Contractor is required to ensure they stay compliant with statutory requirements and construction programs and processes and include such aspects in their Health and Safety File.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

PRIMARY HEALTH AND SAFETY COMPLIANCEProject: **SOFTBALL STADIUM****ANNEXURE A**

The Principal Contractor and Contractors must submit compliance with Annexure 'A' before commencing on work on site. **Compliance with Annexure 'A' must be maintained and proven to the Safety Agent at audits.**

HSS Item no.	Requirement	Legal Reference	Compliance required:
A1	Health & Safety Plan (H & S Plan)	Constructions Regs.	Withing one weeks of receipt of these specifications
A2	Notification of intention to commence construction / building work	Complete schedule 1 (Construction Regs.)	Before commencement on site
A3	Assignment of responsible persons to supervise construction work	OHS Act ~ Section 16(2) appointee ~ all written appointments under the construction regulations 2014	Before commencement on site
A4	Competence of responsible persons in the form of CV's related work history of appointees	OHS Act ~ Section 16(2) appointee ~ all written appointments under the construction regulations 2014	Together with H & S Plan
A5	Compensation for occupational injuries and diseases – proof of registration and in good standing	COIDA or FEMA	Together with H & S Plan
A6	Health and safety organogram showing all safety management portfolios and positions	Polokwane Municipality requirement	Together with H & S Plan
A7	Initial hazard identification and risk assessment document	Construction regulations	Together with H & S Plan
A8	Fall protection plan (first draft) as defined in the construction regulations also, see	Construction regulations	Together with H & S Plan

HSS = health & safety specifications

OHS Act = occupational health & safety Act

CR = construction regulations

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

COIDA = compensation for occupational injuries and diseases Act

ASSIGNMENT OF PRINCIPAL CONTRACTOR'S AND CONTRACTORS' RESPONSIBLE PERSONS

Project: **SOFTBALL STADIUM**

ANNEXURE B

The Principal Contractor must make all the management appointments as set out below. Compliance with annexure 'B' to be maintained and proven to the safety agent at audits (Further appointments could become necessary as the project progresses).

Item no.	Appointment	Legal Reference	Requirement
B1	CEO Assignee	Section 16(2)	A competent person to assist the CEO in achieving compliance with the OHS Act – P/Contractor's / Contractor's Responsible person
B2	Construction Work Manager	CR 8(1)	A full time competent person to Supervise and be responsible for health & safety related issues on site. The person is appointed by the Section 16(2)
B3	Assistant Construction Work Manager	CR 8(2)	A full time competent person(s) to assist the CR 8(1) appointee with daily supervision of construction work safety. One of the CR8(2) appointees must be designated to fulfill the role of the CR6(1) when such person is not on site. Make this clear in the appointment letter
B4	Health & Safety Representative(s)	Section 17	A competent person(S) to be appointed to represent the workforce in H & S matters. Reps may attend safety meetings, conduct monthly site audits, attend incident / injury investigations and make recommendations as far as H&S goes.
B5	Health & Safety Committee Member(s)	Sectin 19	H&S reps, site supervisors / foreman and the safety officer should make up the committee, with the CR8(1) appointee chairing the committee.
B6	Incident Investigator	GAR 9	A competent person to head up the investigation team and co-ordinate incident / injury investigation ons site.
B7	Risk assessment co-ordinator	CR9	A competent person to co-ordinate the drafting / reviewing / distribution of risk assessments on behalf of the principal contractor. The same applies to contractors. NQF Level 5

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

B8	Fall protection plan co-ordinator	CR10	A competent person to co-ordinate the drafting / reviewing / distribution of Fall Protection Plan. The same applies to contractors. NQF Level 4
B9	Emergency plan co-ordinator	Contractor Needs to be in line with service stationERP	A competent person to co-ordinate the drafting / reviewing / distribution of the site emergency procedures / evacuation plan. Such person must be fulltime on site so as to take charge of emergency situations.
B10	First Aider(s)	GSR 3	A certified person to address first aid situations and take charge of injuries. Level 1 certificate
B11	Lifting machine and lifting tackle supervisor	DMR 18	A competent P/Contractor employee to co-ordinate the management of lifting machines and tackle, ensuring that such equipment is safe for use at all times, inspected when necessary and repaired when required. The operators, banks men and contractors to liases with this person
B12	Scaffolding inspector	SANS 10085 – 2004	A competent person to inspect scaffolding before use and every time after bad weather, etc.
B13	Scaffold supervisor (P/Contractor)	SANS 10085 – 2004	A competent P/Contractor employee to supervise all scaffolding on site, ensuring that scaffolds are safe for use, inspected, extended / altered, repaired when required and that all trades are co-ordinated and authorised to work on such scaffolds
B14	Scaffolding erector	SANS 10085 – 2004	A competent person(s) to erect scaffolding – leader of the scaffold team
B15	Formwork & support work supervisor (Temporary Works)	CR12	A competent person to supervise all formwork & support work erection & dismantling. This person must also ensure that the equipment is safe and that all the necessary inspections (pre, during, post & every day thereafter) are carried out & records kept by the competent inspectors. Design drawings must be available to this supervisor.
B16	Excavation supervisor / inspector	CR13	A competent person to supervise & inspect excavation work (daily) and ensure that excavations are safe. Records of inspections must be kept by this person.
B17	Ladder inspector	GSR13A	A competent person to inspect ladders daily and ensure they are safe for use, keeping monthly record.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

B18	Stacking supervisor	CR28	A competent person to supervise all stacking and storage operations
B19	Explosive powered tools inspector / supervisor	CR21	A competent person to inspect & clean the tool daily, store the tool in a safe location, ensure that cartridges are signed out and in, and control all operations thereof.
B20	Temporary electrical installations inspector	CR24	A competent person to inspect all temporary electrical installations. Including weekly inspections and record keeping.
B21	Portable Electrical Tool Inspector	CR 24	A competent person to co-ordinate / inspect portable electrical tools, leads and plugs.
B22	Fire-fighting equipment inspector	CR29	A competent person to co-ordinate & inspect fire fighting equipment. Including ad-hoc checks and monthly inspections with records kept.
B23	Construction vehicles & mobile plant supervisor	CR23	A competent person(s) to co-ordinate the safety of all construction vehicles & mobile plant. Ensuring that daily inspections are done and records kept, that safety measures are in place, that operators are certified and authorised to operate and that maintenance and services are carried out when required.
B24	Construction safety officer	CR8(5)	A competent person to fulfill the functions as set out in these HSS

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

GENERAL COMPLIANCE REQUIREMENTS

Project: **SOFTBALL STADIUM**

ANNEXURE C

The Principal Contractor and Contractors must comply with but not be limited to the requirements tabled below: Prove compliance with annexure 'C' at audits conducted by the safety agent.

Item no.	What	When	Output	Reviewed by Polokwane Municipality Agent
C1	Construction – phase Health & Safety Plan	Monthly review	Principal Contractor to indicate the status of Contractors health & safety plans	
C2	Health & Safety File(s)	Open file when construction begins and maintain throughout	Have file on hand at audits. Contractors to report on their file at monthly health & safety audits by the Principal Contractor.	
C3	OHS Act and relevant Regulations	Monthly review	To be kept in the health & safety file on site.	
C4	Health & Safety Induction training, PTW Procedures & SKM Passport System	Every worker before he/she starts work	Attendance registers to be kept	
C5	Awareness Training (Tool Box Talks)	At least once a week	Attendance registers to be kept	
C6	Health & Safety Meetings	Monthly	Meeting minutes to be kept	
C7	Health & Safety Reports & PI / NM	Monthly	Report covering: - Incidents / injuries and investigations - Non conformances by employees & Contractors – reports - Internal H&S audit reports	

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

C8	Audits on contractors	Monthly	<u>Report covering:</u> • H&S File / Plan • WCA status • Appointment letters • Section 37(2) agreements • Risk assessment & safe work procedures • Physical site inspection • Any other contractor specific requirements	
C9	Emergency procedured	Monthly evaluation of procedure	Compile written procedure as well as tel. Numbers	
C10	Risk assessments & fall protection plan	Updated and signed off	Documented risk assessments to be available	
C11	Method statements	Drawn up and distributed before workers are exposed to the risks	Documented set of method statements reviewed and signed off.	
C12	General Inspections	Daily	<u>Report OHS Act compliance:</u> • Excavations • Portable electrical tools • Formwork & support work • Explosive powered tools	
C13	General Inspections	Daily	• Scaffolding • Temporary Electrical Installations	
C14	General Inspections	Monthly	• Fire fighting equipment • Ladders	
C15	General Inspections	Monthly	• Lifting tackle • Oxy-acetylene cutting & welding sets • Fall prevention and arrest equipment	
C16	General Inspections	6-Monthly	• Lifting machines	

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

C17	Load tests / performance tests	Annually / once erected, before use	Lifting machines	
C18	List of Contractors	List to be updated weekly	Compile a list of contractors: Name, supervisor, company tel. Numbers and trade.	
C19	Workman's Compensation	Ongoing	Compile a list of Contractors workman's Compensation proof of good standing.	
C20	Construction site rules & Section 37(2) Mandatory Agreements	Ongoing	Compile a list of all signed up Mandataries. Proof of agreement documents to be kept in H&S file.	

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

OCCUPATIONAL HEALTH & SAFETY – HEALTH & SAFETY COSTS TO BE INCLUDED IN THE PRINCIPAL CONTRACTOR'S / CONTRACTORS' PRICE

Project: **SOFTBALL STADIUM**

ANNEXURE D

In terms of the Construction Regulations (2014), it is the Polokwane Municipality's duty to ensure that the cost for health & safety has been provided for by the Principal Contractor, before appointment.

Acting on behalf of our Polokwane Municipality, we require the following health & safety costs to be included by the Principal Contractor. It must be made very clear that these are just some of the health & safety costs to be included in your tender price. It is the duty of the Principal Contractor and Contractors to ensure that all aspects of the Occupational Health & safety Act 85/1993 and Construction Regulations are catered for.

Pricing for Occupational Health and Safety measures should include the following if applicable:

ITEM	DESCRIPTION
1	Supply of all items of Personal Protective Clothing/Equipment & ensure use thereof for full compliance
1.1	Steel toe capped safety boots
1.2	Overalls
1.3	Reflective vests(high visibility)
1.4	Hard hats
1.5	Dust masks
1.6	Hearing protection
1.7	Hand gloves
1.8	Any other :Principal Contractor to specify
2	Supply and provision of Equipment for working at Heights & ensure use thereof for full compliance
2.1	Fall protection equipment (Safety Harness)
2.2	Double lanyard harness
2.3	Fall protection plan
2.4	Scaffolding access ladders/toe boards/hand rails
2.5	Portable Ladders
2.6	Any other: Principal Contractor to specify :
3	Barricading: Supply & install, including removal upon completion to ensure full compliance to legislation
3.1	Rigid type barricading
3.2	Temporary fence barricading along perimeter of excavated area
3.3	Danger tape pre-warning tape
3.4	Any other: Principal Contractor to specify :
4	Related Training
4.1	First Aid Training
4.2	Health and Safety Representative training

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

4.3	Emergency Rescue training(Height)
4.4	Hazard Identification Training
4.5	Training of Personnel working at heights
4.6	Construction Plant Training
4.7	Legal Liability(OHSACT) Training
4.8	COLD ACT Training
4.9	Scaffold Erector and Inspector Training
4.10	Any other: Contractor to specify : Working at elevated
5	Occupational Health and Safety Administration
5.1	Develop of a Site Specific Health and Safety Plan and Hazard and Risk Assessment by Competent person.
5.2	Develop of Fall Protection and Rescue Plan by a Competent Fall Protection Plan Developer.
5.3	Competent Occupational Health and Safety Officer/Consultant.
6	Medical Surveillance
6.1	Medical Certificates of fitness for all Employees by an Occupational Health Practitioner.
6.2	Medical Certificates of fitness for all EPWP Employees by an Occupational Practitioner during the duration of the Construction Project.
7	Facilities and Equipment
7.1	Sanitary facility for each sex and for every 30 workers.
7.2	Changing facilities for each sex.
7.3	Sheltered eating areas
7.4	First aid boxes
7.5	Fire extinguishers
7.6	Waste bins
8	Safety Signage
8.1	Sufficient and adequate safety signage on constructions site and at all flammable stores.

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

ANNEXURE E

The Occupational health and Safety File must consist out of the following documentation:

INDEX

1	Appointment Letter from Polokwane Municipality.
2	Notification of Construction work.
3	Letter of Good standing - COID
4	Copy of Public Liability Insurance Policy and UIF Registration
5	Health and Safety Specifications
6	Scope of Work
7	Tool and Machinery list
8	Method Statement of all work that will be conducted.
9	Risk Assessment Guide / Procedure
10	Baseline Risk Assessments
11	Safe Work Procedures for all Risks
12	Health and Safety Information from Designer
13	Medical Certificates
14	All Health and Safety Related Policies
15	Section 37.2 Agreements
16	Induction Training Information
17	Site Specific Emergency numbers and Emergency Plan
18	Site Specific Fall Protection and Rescue Plan
19	Site Specific Health and Safety Plan
20	Incident / Accident Management Control
21	Traffic Management Plan
22	Contractor Control Procedures
23	Environmental Management
24	Hazardous Chemical Substance Register and MSDS
25	Example of Monthly Health and Safety Report
26	Health and Safety Organogram
27	Occupational Health and Safety (Construction) Appointments – With Competencies
28	Certificates for all lifting equipment
29	Sample of all registers that will be used on site.
30	Copy of Construction Building Plans (A4)
31	Copy of the Occupational Health and Safety Act and Construction Regulations 2014

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

ANNEXURE F

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (Regulation 4 of the Construction Regulations. 2014)

NOTIFICATION OF CONSTRUCTION WORK

1. (a) Name and postal address of principal contractor:

(b) Name and tel. No of principal contractor's contact person:

2. Principal contractor's compensation registration number:

3. (a) Name and postal address of Polokwane Municipality:

(b) Name and tel. No of Polokwane Municipality's contact person or agent:

4. (a) Name and postal address of designer(s) for the project:

(b) Name and tel. No of designer(s) contact person:

5. Name and telephone number of principal contractor's construction supervisor on site appointed in terms of regulation 8(1).

6. Name/s of principal contractor's sub-ordinate supervisors on site appointed in terms of regulation 8(2).

7. Exact physical address of the construction site or site office:

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

8. Nature of the construction work:

9. Expected commencement date: _____

10. Expected completion date: _____

11. Estimated maximum number of persons on the construction site.

Total: _____ Male: _____ Female: _____

12. Planned number of contractors on the construction site accountable to principal

Contractor: _____

13. Name(s) of contractors already selected.

Principal Contractor

Date

Polokwane Municipality's Agent (where applicable)

Date

Polokwane Municipality

Date

➤ THIS DOCUMENT IS TO BE FORWARDED TO THE OFFICE OF THE DEPARTMENT OF LABOUR **PRIOR TO COMMENCEMENT** OF WORK ON SITE.

➤

Copies:

1. Original to **Department of Labour**
2. Copy in File

Construction	Date	Author	OHS Spec Rev
Softball Stadium	February 2020	H. Heyneke	OHSS-050320

ANNEXURE E-GEOTECH



GEOTECHNICAL INVESTIGATIONS REPORT OF THE PROPOSED CONSTRUCTION OF THE POLOKWANE INTERNATIONAL SOFTBALL STADIUM (ALTERNATE SITE), LIMPOPO PROVINCE, SOUTH AFRICA.

Report Number: 91594

Prepared by the Geotechnics Consulting Division of Bashan Corporation (Pty) Limited for:

Roadlab Laboratories

Acting for and on Behalf of:

Makone Consulting Engineers (Pty) Ltd



This Technical Document has been prepared for the exclusive use of Makone Consulting Engineers (Pty) Ltd (Makone Consulting) and it's authorised Project Partners and has been issued based on instructions to proceed with the Project, as issued by Makone Consulting (through Roadlab Laboratories). No entity other than Makone Consulting Engineers (and its Project Partners) is authorised to (and / or should) place any reliance whatsoever (either in whole or in part), on this Document.

Author (s):		
Kelvin Chimanya Pr.Sci.Nat.	Principal Engineering Geologist	BSc (Hon) Geology, SACNASP, MSAICE, MSAIEG
Date:	19 September 2019	
Project Number:	91594	
Effective Date:	Thursday, 19 September 2019	
Copies:	<i>Roadlab</i>	(01)
	<i>Makone Consulting</i>	(02)

Document Change Control

Version	Description	Date
1.0	Data Interpretations & GIS Updating	13 September 2019
1.1	First Draft Report	16 September 2019
1.2	Final Draft Report	17 September 2019
1.3	Peer Review	18 September 2019
2.0	Final Geotechnical Report	19 September 2019

Document Review and Sign Off:



Primary Author

Kelvin Chimanya Pr.Sci.Nat. (MSAICE, MSAIEG)

Principal Engineering Geologist

Bashan Corporation (Pty) Ltd

Peer Review

Willem Cockcroft

Roadlab Laboratories (Pty) Ltd

Bashan Corporation (Pty) Ltd

P.O Box 1084, Wilgeheuwel, 1736, Gauteng Province, South Africa

T +27 (0) 11 029 1981 M +27 (0) 81 551 9343 E geotech@bashancorp.co.za W www.bashancorp.co.za

Table of Contents

1	INTRODUCTION AND TERMS OF REFERENCE	4
1.1	Purpose of the Report	4
1.2	Project Objectives.....	4
1.3	Project Description	4
1.4	Sources of Information and Standard Codes	5
1.5	Professional Credentials of Competent Person	6
2	PROPERTY DESCRIPTION	7
2.1	General Site Location	7
2.2	Climate	9
2.2.1	Macro-Climatic Indicators	9
2.2.2	Seismicity	10
3	GEOLOGICAL SETTING.....	11
3.1	Regional Geology	11
3.1.1	Site Geology	11
3.2	Structural Geology	13
3.3	Hydrogeological Review	13
3.3.1	Regional Review	13
3.3.2	Project Groundwater and Surface Water Conditions	13
3.4	Engineering Geology Review	14
4	FIELD INVESTIGATION SURVEY	16
4.1	Reconnaissance Survey	16
4.2	Field Survey.....	16
4.2.1	General Topography	16
4.3	Dynamic Cone Penetrometer Soundings	16
4.4	Test Pit Excavations	18
4.5	Soil Profiles.....	21
4.5.1	Transported soil.....	21
4.5.2	Residual soil	22
4.6	Bulk Sampling and Engineering Materials Testing.....	22
4.6.1	Index Tests.....	23
4.6.2	Modified AASHTO Subgrade Rating	23
4.6.3	Foundation Indicators	23
4.6.4	Soil Aggressiveness	23
4.7	Chemical Reactive Soil Status	26
5	SITE ENGINEERING MATERIALS EVALUATION	27
5.1	General Stratigraphy and Material Classification	27
5.1.1	Topsoil.....	27

5.1.2	Coarse Colluvium	28
5.1.3	Reworked Residual Soil	28
5.1.4	Residual Soil	29
5.2	Geotechnical Classification	29
5.3	Geotechnical Risk Assessment.....	30
5.4	Project Site Classification	31
5.4.1	Collapsible and Compressible Soils	31
5.4.2	Potential Settlement	32
5.4.3	Active Clays.....	32
5.4.4	Erodibility Potential.....	33
5.4.5	Undermined Ground	33
5.4.6	Sinkhole Formation	33
5.4.7	Soil Permeability and Flooding.....	33
5.4.8	Shallow Seepage	33
5.4.9	Steep Stability	34
5.4.10	Excavatibility.....	34
6	GEOTECHNICAL RECOMMENDATIONS	35
6.1	Geotechnical Site Class Zonation	35
6.2	Foundation Assessment.....	36
6.2.1	Structural Founding for Single Storey Building.....	36
6.2.2	Proposed Construction Methods	36
6.3	Terraces and Parking Areas.....	37
6.4	Excavation Requirements and Trenchability	38
6.5	Pipe Bedding	38
6.6	Construction Materials.....	38
6.7	Construction Site Management.....	39
6.7.1	Site Preparation.....	39
6.7.2	Earthworks	40
6.8	Stormwater Management	41
6.9	Reactive Soils.....	41
6.10	Special Precautionary Measures and Construction Monitoring	42
7	CONCLUSIONS AND DISCUSSIONS.....	43
7.1	Conclusions	43
7.2	Discussions	44

List of Tables

Table 1 –Table climatic indicators of the project site	9
Table 2 – Relationship between the Weinert N-Values and weathering characteristics	9
Table 3 – Engineering geology review	15

Table 4 – DCP sounding survey results	17
Table 5 – Test pit collar information	19
Table 6 – Soil sublayer thickness summary	21
Table 7 – Summary of the Mod AASHTO subgrade rating results	24
Table 8 – Summary of the foundation indicators	25
Table 9 – Test pit collar information	26
Table 10 – General site stratigraphy	27
Table 11 –Preliminary geotechnical classification for development	30
Table 12 – Potential geotechnical constraints of the project	30
Table 13 – Residential site class designation classes	35
Table 14 –Foundation design parameters	37
Table 15 – Proposed design parameters for terraces and parking areas	37
Table 16 – Classification of materials for machine excavations	38

List of Figures and Plates

Figure I – Aerial view of the proposed construction site	7
Figure II – General site locality map of the proposed site	8
Figure III – Weinert map of South Africa	10
Figure IV – Regional Geological map of the project site	12
Figure V – Test pit and DCP station locality plan of the project site	20

List of Appendices

Appendix A–Test pit soil profiles and laboratory test results

1 INTRODUCTION AND TERMS OF REFERENCE

1.1 Purpose of the Report

Makone Consulting Engineers (Pty) Ltd ("Makone Consulting" or the "Client") has appointed Roadlab Laboratories (Pty) Ltd ("Roadlab") to conduct site geotechnical investigation services at the proposed construction site (alternate) of an international softball stadium near the city of Polokwane.

Roadlab, acting in a coordinated effort together with the Competent Person for the Geotechnical Consulting Division of the Bashan Group ("Bashan Geotechnics" or "the Consultant") has agreed to perform an independent geotechnical assessment of the proposed construction site and to produce a Competent Person's Geotechnical Report.

Bashan Geotechnics understands that one of the greatest risks is in the ground. The soil, rock and water form the core foundations upon which our social and physical infrastructure is built. Hence, our specialist knowledge of these components during the early planning phases (and through to design and construction) of a project can ensure success.

1.2 Project Objectives

The report sets out to obtain geotechnical information for the detailed design of the proposed new construction of a commercial at the project site. To this purpose, a geotechnical investigation was carried out to assess the in-situ soils and to determine their properties and expected behaviour. The following activities were conducted on site: -

- Evaluation of the site-specific geology and hydrogeology of the site and to establish the subsoil conditions prevailing at the proposed project site;
- Evaluation of the field geotechnical properties of the soils by the identification of potentially adverse conditions (including problem soils and substrata, stability of the sidewalls, soil excavability, areas of high water table and slope stability) and defining potential geotechnical restraining factors as well as providing recommendations on mitigating risks;
- Laboratory testing to classify the available in-situ soils and to comment on the suitability of the in-situ soils for re-use as construction materials, and;
- Submitting appropriate recommendations regarding the founding solutions and risk mitigating measures for the sole aim of aiding the effective design of the proposed building structures on site.

1.3 Project Description

Makone Consulting is an engineering and project management consulting agency that offers engineering design solutions in construction management. The following project information applies to the Project:

- **Project Title:** Construction of the Polokwane International Softball Stadium.
- **Principal Project Owner:** City of Polokwane.
- **Farm:** Portion 00 of the Remaining Extent of Farm Sterkloop (688 LS).
- **Municipality:** Polokwane Local Municipality.
- **Development Type:** New sports complex (incorporating a stadium with parking areas).
- **Project Phase:** Engineering design / new construction.
- **Central Coordinates:** 23° 55' 12.83" S / 29° 28' 02.80" E (WGS84 Datum).
- **Architects:** (TBC).
- **Civil Engineers:** Makone Consulting Engineers (Pty) Ltd.

1.4 Sources of Information and Standard Codes

Instructions to proceed with the Project and other information (such as the scope and location details) required to complete the field geotechnical investigations (on site) were obtained from the Client prior to site mobilisation. In addition, the following supporting documents were utilised during the Desktop study for the current project, and include:

- Geological Map of the Pietersburg area (Sheet 2328), 1985; 1:250 000 Scale, Geological Survey of South Africa, Printed by the Government Printer.
- Topographic map of the Pietersburg area (Sheet 2329CD), 1998; 1: 50 000 Scale, Chief Directorate – Surveys and Mapping.
- South African Institution of Civil Engineering (SAICE), 2010: Site Investigation Code of Practice, Geotechnical Division, First Edition.
- Committee for State Road Authorities, 1985: TRH14 - Guidelines for Road Construction Materials, Department of Transport.
- National Department of Housing, 2002: Generic Specification GFSH-2, Geotechnical Site investigations for Housing Developments.
- National Housing Builders Registration Council of South Africa, 2014: Home Building Manual, 2014
- South African Institution of Civil Engineers and the Institution of Structural Engineers, 1995: Code of Practice for foundations and Superstructures for Single Storey Residential Buildings of masonry Construction, Joint Structural Division

1.5 Professional Credentials of Competent Person

Mr Kelvin Chimanya, a professional Engineering Geologist (with more than 18 years' experience) has compiled this Geotechnical Report. Mr Chimanya is registered with the South African Council for Natural Scientific Professions (SACNASP), the South African Institution of Civil Engineering (SAICE) and the South African Institute of Engineering and Environmental Geologists (SAIEG). He remains a specialist Member of both the Geotechnical and Environmental divisions of SAICE.

In addition, Mr Chimanya is also a Competent Person as defined by the NHBRC. He has been involved in the design, execution and management of various geotechnical investigations projects and has been involved in the drafting of various, Competent Person's Reports on various occasions in his career.

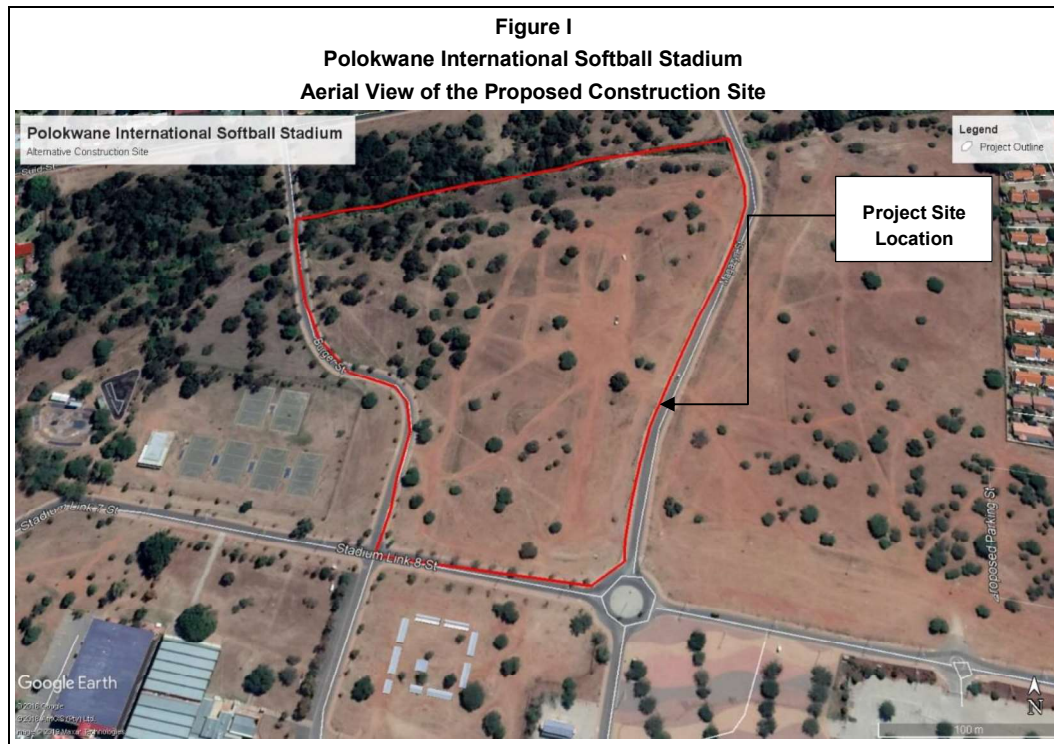
2 PROPERTY DESCRIPTION

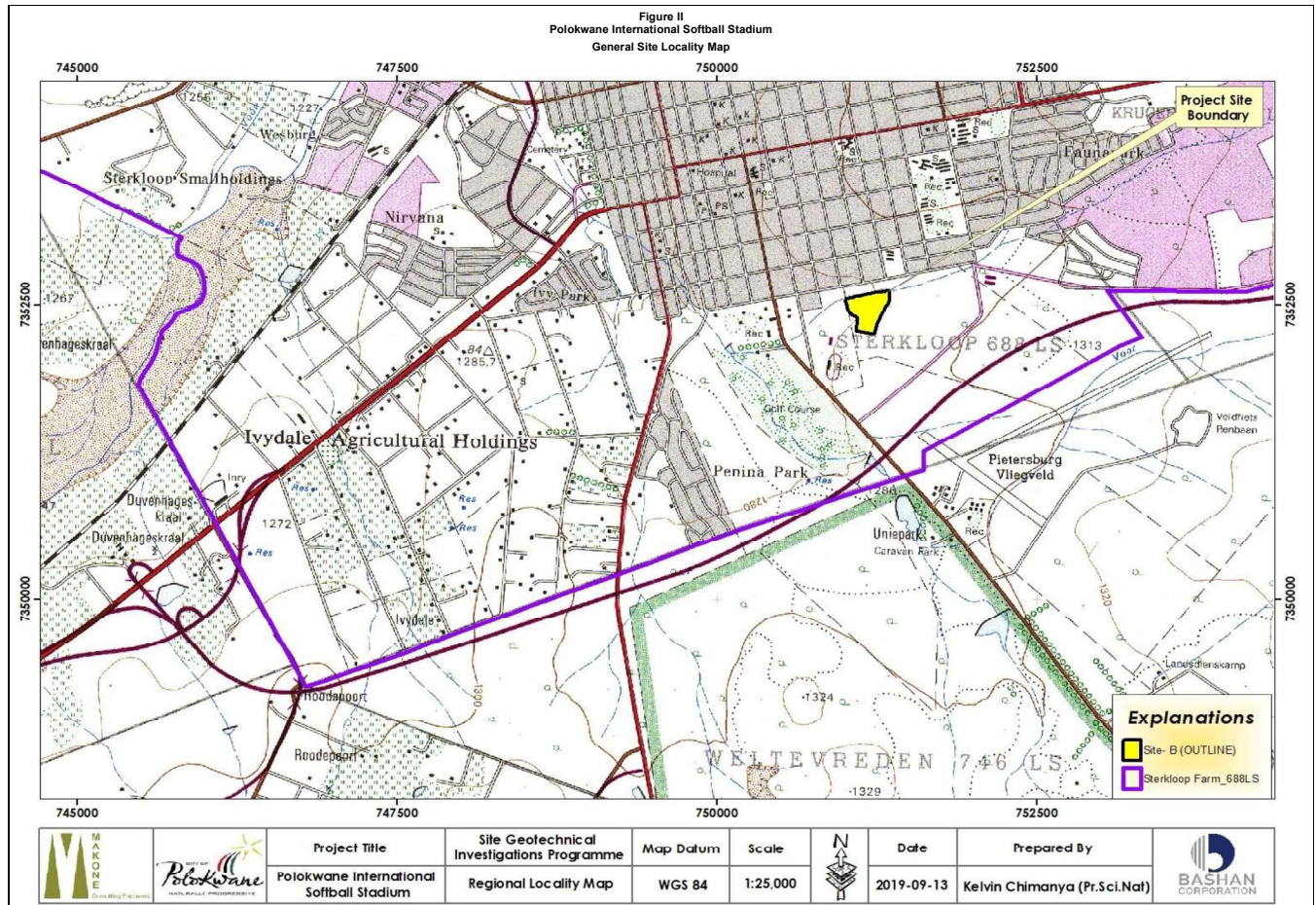
2.1 General Site Location

The new proposed project construction site is located near the city of Polokwane, the capital of the Limpopo Province of South Africa. Other major sports complexes within Polokwane includes the new Peter Mokaba Stadium, a football and rugby union stadium (with a capacity of 45 500) and was used for the 2010 FIFA World Cup.

The proposed development site is situated near the Extension 24 of the wider city of Polokwane and is part of a bigger area that was previously used for agricultural purposes (in the past) but currently has seen advanced residential development. The Polokwane local municipality will provide services like water, sewerage, electricity and solid waste disposal to the proposed development.

Figure I shows the aerial view of the project site whilst **Figure II** shows the general site locality map produced by incorporating the existing topographic maps and other data into our Geographical Information System (GIS).





2.2 Climate

The Köppen Climate Classification subtype for the area around the town of Polokwane characterised as the mid-latitude steppe and desert climate (**Bsh**). The average annual temperature for the area is 18.8°C.

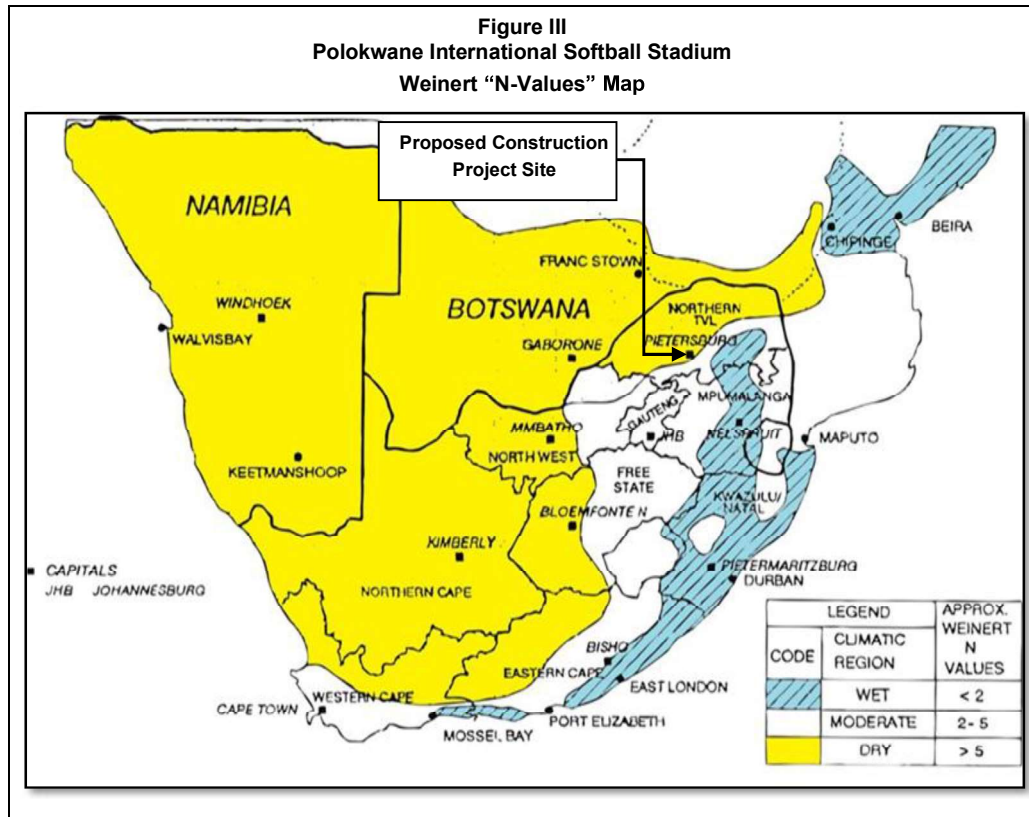
The average annual precipitation for Polokwane is 530.9 mm. The rainy season lasts from about November to March. Rain is mainly in the form of thunderstorms. There are an average of 51 days of precipitation, with the most precipitation occurring in November (with 9 days) and the least precipitation occurring in July (with 0.8 days). The average climatic indicators are depicted in **Table 1**.

Table 1 Polokwane International Softball Stadium Climatic Indicators of Witbank (Source: www.weatherbase.com)												
Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Average Temperature (°C)	22.8	22.8	21.1	18.3	15.6	12.8	12.8	15.6	18.9	21.1	22.2	21.7
Average Precipitation (mm)	80	80	60	20	20	10	10	10	20	50	100	70

2.2.1 Macro-Climatic Indicators

The macro-climatic regime of an area plays a fundamental role in the development of a soil profile and the weathering of rocks. From an engineering point of view, a soil can be regarded as any uncemented or a weakly cemented accumulation of mineral particles formed mainly by the weathering of rocks, with void spaces filled with air and / or water between the particles. Weinert (1980) developed the N-value to differentiate between regions of similar weathering characteristics. The weathering characteristics for areas of similar N-values are summarised in **Figure III** and **Table 2**.

Table 2 Polokwane International Softball Stadium Relationship Between Weinert N-Values and Weathering Characteristics			
N Value	Mode of Weathering	Weathering Characteristics	Principle Secondary Minerals
> 10	Mainly Disintegration	-Thin weathering layer -No secondary minerals.	-Almost none
5 - 10		Few secondary minerals	Hydrous mica (illite)
2 - 5	Mainly Decomposition	-Weathering profile deepens towards N=2 -Significant secondary minerals	-Kaolinite -Montmorillonite
< 2		-Montmorillonite changes to kaolinite in top soil layers; -Deep weathering profiles	-Kaolinite -Montmorillonite
< 1		Montmorillonite and kaolinite change to sesquioxides; Very deep weathering profiles	Kaolinite, sesquioxides



A brief review of the above map confirms that the Weinert's N-Value for the project site moderate (between 2.5 - 5). This indicates that the weathering of primary minerals will be predominantly via chemical processes (or decomposition). It is highly anticipated that abundant secondary minerals (such as kaolinite and montmorillonite) will be produced.

2.2.2 Seismicity

Southern Africa region is known for its relative seismic stability. Only a small number of medium-intensity earthquakes have occurred since the 17th Century. However, approximately 40 to 60 tremors occur monthly and occur near the deep gold mining areas of South Africa.

Based on the seismic hazard map of South Africa, the proposed is classified as having a seismic intensity with a peak acceleration having a 10% probability of (0.04 g and 0.08 g) of being exceeded in a 50-year recurrence period. This includes both natural and mining-induced seismicity. The proposed site is **not** located in seismically hotspot area.

3 GEOLOGICAL SETTING

3.1 Regional Geology

The following description of the regional and site geology of the area has been interpreted from both the site observations and a **desktop review** of the published geological map of the Pietersburg area (sheet 2328) which covers the proposed construction site. The regional geological map of the area is shown in **Figure II**.

Based on the information extracted from the regional geological map, the site geology is potentially underlain (at depth) by rocks assigned to the Pietersburg Group (**Zp**), the Hout River Gneiss (**Rhr**), the Turfloop Granite (**Vt**) and some overlying Quaternary Deposits (**Q**).

3.1.1 Site Geology

The oldest rocks found at the site are assigned to the Mothiba Formation (**Zpm**) of the Pietersburg Group. Rocks of the Pietersburg Group occur as two belts and as scattered xenoliths enveloped in granitoid rocks. Rocks assigned to the Mothiba Formation include various ultramafic metavolcanics including talc rich, talc-chlorite and amphibole-chlorite schists and serpentinite.

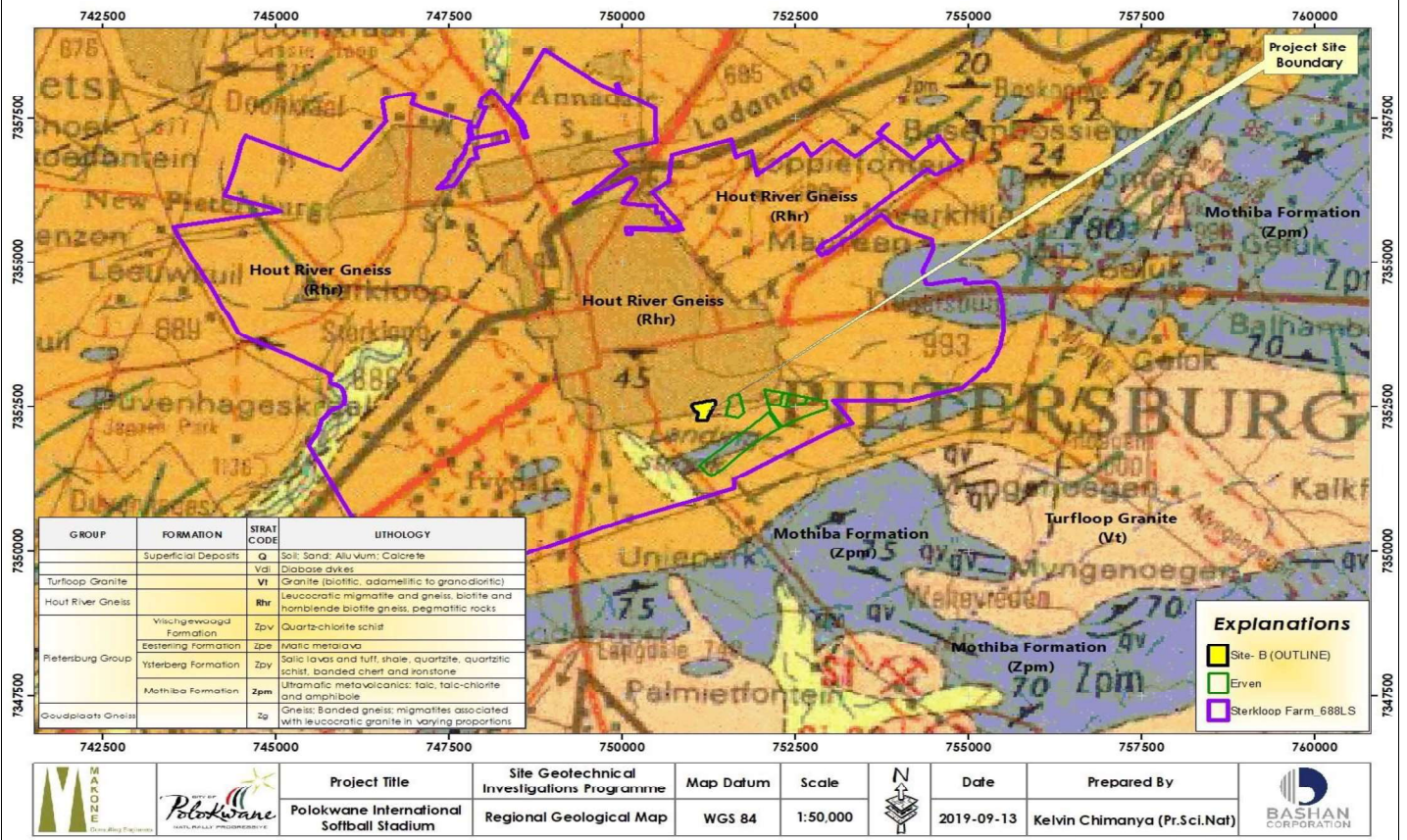
The Hout River Gneiss (**Rhr**) includes a variety of granitoid rocks that show clearly intrusive relationships. It includes leucocratic migmatite and gneiss, hornblende-biotite gneiss, biotite gneiss and pegmatite.

The project site is located near the stratigraphic contact between the Letaba and the Clarens Formation. Diabase intrusions (**Vdi**) in the form of sills, sheets and dykes cover the upper sections of the site stratigraphy. On a regional scale, Diabase occurs as a network of dykes, sills or sheets intruded into the sedimentary strata along the bedding planes and fractures.

Diabase dykes occur throughout the area and they appear to form northeasterly trending swarms. On surface exposure, dykes are commonly mapped as being generally only a few meters wide (3 – 10 m wide) but extending for several kilometres (5 – 30 km) long. When intercepted in test pits, diabase is usually observed in five different categories, namely; solid or fresh; fractured; **boulders**; gravelly; granular (or sugary) and as residual Diabase soil.

Deposits of Quaternary age (**Q**) consisting of a discontinuous cover of fine colluvial soils of colluvium, talus, alluvium and calcrete is observed. A large proportion of the Polokwane Golf Course area is covered by light coloured soils of alluvial origin.

Figure IV
Polokwane International Softball Stadium
Regional Geological Map of the Proposed Construction Site



3.2 Structural Geology

A number of southwest-northeast trending faults are present in the southwest of the mapped sheet. Most prominent of them is the Ysterberg tear fault that appears to follow the valley of the Sand River. Diabase dykes in the area appear to be associated with minor or late-stage faulting in the area.

3.3 Hydrogeological Review

3.3.1 Regional Review

The water-holding capacity of construction materials (such as soil) is dependent on a range of engineering properties including particle size distribution, clay type present, amount of organic matter, bulk density and structure of the soil. The regional hydrogeology may be defined by three potential aquifer systems namely; a deep aquifer system; a shallow or weathered aquifer system, and a; perched aquifer. The regional hydrogeology of the area around Polokwane may be defined by upto four potential aquifer systems

- **Deep aquifer systems** are prevalent in fresh granitoids and are often associated with fractures (joints, discontinuities) within the rock mass.
- **Shallow or weathered aquifers** generally occur in a weathering profile overlying hard rock types. The groundwater is mainly stored within primary voids in the weathered zone. The depth of the shallow weathered aquifer may vary considerably depending on the climate, geological conditions and rock type.
- **Perched aquifers** are defined as independent and isolated areas of groundwater situated above the groundwater level and separated from it by unsaturated soils/rocks. These types of aquifers occur in the vadose zone, generally occurring on top of clay lenses within low permeability. They also occur on top of pedogenic layers such as hardpan calcrete or ferricrete.
- **Shallow seepage** is the body of groundwater that is frequently (but not always) located above the groundwater level (usually within the top 1.50 m below the existing ground surface). It is rarely independent or isolated and is normally hydraulically connected to surface water systems.

Seepage and the presence of perennial fluctuations of ground water (if encountered on site) should provide an indication that precautions guiding damp proofing of the proposed structure will have to be strictly adhered to.

3.3.2 Project Groundwater and Surface Water Conditions

It is generally assumed that no groundwater will be used because the proposed development will be serviced by the infrastructure of the local district municipality. Groundwater movement within the project site is controlled by geological and / or structural factors. Regionally, various aquifer subtypes may be defined that are related to the lithologies underlying the area.

The groundwater resource found near the town of Polokwane is associated with basins of weathering troughs of the country bedrock. Locally, various aquifer subtypes may be defined that are related to the lithologies underlying the area. Groundwater may hence be observed to surface at various spring sites. These sites may include dykes intersecting features, contacts of diabase sills / sheets, basal contact of the fractured country rocks with an underlying Diabase horizon (less permeable) and on weathered basins (usually the weathered, diabase sheets or country rocks). Fractured zones are often associated with Diabase intrusions, shear zones and lithological boundaries.

The peak strike zone is within 5 m above and below the base of weathering and fracturing as deduced from drill cuttings provided of course that the base lie below the water level. The number of strikes above the base is limited by shallow depths of weathering / fracturing.

In the hard rock formations of the Polokwane Plateau, the majority of groundwater strikes have been made within 80 m from the surface. Within this band strikes are concentrated around the transition from weathered and fractured to fresh rock.

Where the base of weathering and/or fracturing is less than 25 to 40 m deep, water is largely struck within the first 20 m below the base. Where its depth exceeds 25 to 40 m water is struck mostly above the base. Few boreholes have been drilled deeper than 110 m with the majority of water strikes made within 40 m below groundwater level.

3.4 Engineering Geology Review

A soil is formed when a parent rock is broken down by chemical and physical weathering processes. If the products of weathering remain at their original location (in-situ weathering, they constitute a residual soil). On the other hand, when the products of weathering are transported and deposited in a different location, then they constitute a transported soil.

Weathering is the process of alteration and breakdown of rocks into soil materials at and near the Earth's surface by either chemical and / or mechanical decomposition. Rock masses are may also be altered by hydrothermal processes. Regionally within the project area, the depth to bedrock is highly variable, being dependent on the topography, surface lithologies, structural controls and the weathering profile.

Certain soils present problems to civil engineering developments due to the specific conditions in which these soils occur. Uniform heave, shrinkage, collapse settlements or consolidation settlements generally do not cause damage to structures, but may detrimentally affect service (water and sewerage) pipe entries at the perimeter of structures. **Table 3** shows some of the potential engineering impacts associated with the soils found at the project site.

Table 3 Polokwane International Softball Stadium Engineering Geology Review		
Parent Rock Type	Material Formed	Associated Engineering Impact
Transported soil (colluvium / alluvium)	- Clayey sand - Silty sand / Sand - Clay soil	- Collapsible grain structure - High compressibility - Heave
Metamorphic rocks (marble, slate, hornfels, quartzite, schist, gneiss, anthracite)	- Clayey silty sand - Silty sand / Sand - Angular gravels - Cobbles and boulders	- Low shear strength - Unstable slopes - Slaking (on exposure) - Semi pervious soil to impervious soil - Poor to good compaction / workability

- **Colluvium:** The transported weathering products from both the Quaternary deposits is likely to lead to the formation of fine colluvium in the form of clayey sand, silty sand and / or sandy-clayey-silt mixtures. These secondary products all have a potential to cause a collapsible grain structure, and a high compressibility.

A collapsible fabric may occur in an open-textured, silty or sandy soil that has a high void ratio but yet has a relatively high shear strength in the dry state imparted to it by colloidal or other coatings around the individual grains. Collapsible soils will experience settlement upon saturation from an external source.

This settlement will take place rapidly if the soil is free draining and gradually if it is not free draining. Damage will be confined to portions of the structure as / and when collapse settlement occurs (e.g. beneath foundations adjacent to leaking pipes or adjacent to areas of poor drainage where ponding of rainfall occurs).

- **Metamorphic rocks:** The most prevalent rocks on site appear to be metamorphic rocks assigned to both the Mothiba Formation are predominantly comprised of various metamorphic rocks. These rocks upon weathering often produce residuals soils that are rich in clayey to silty sands. In addition, angular gravels accompanied by cobbles and boulders are also produced. These soils are associated with a low shear strength, unstable slopes, slaking (on exposure), semi pervious to impervious soil and are often associated with a generally poor to good compaction (or workability).
- **Diabase:** Residual soils formed by the advanced in-situ weathering of Diabase often leads to the formation of undifferentiated clays that exhibit expansive characteristics.

Highly expansive clay can cause unexpected ground movements that are able to cause damage to road infrastructure and building structures. The bearing capacity within soft clay material or unconsolidated alluvial material can result in loss of stability or potential collapse of structures during the construction phase of the development.

4 FIELD INVESTIGATION SURVEY

4.1 Reconnaissance Survey

Available information pertaining to the project site and its immediate surrounds was gathered and studied in detail with a view to establishing a preliminary perspective of the site's conditions and potential geotechnical characteristics. Both aerial photographs and Google images were used to obtain the general site orientation and determine the project layout boundaries.

The desktop review enabled the project team to gather the general site information regarding the project's geotechnical constraints (including the site's project location and access aspects, geological and hydrogeological review, the expected problematic subsoil conditions, groundwater and surface water issues).

4.2 Field Survey

A joint team comprising representatives from both Roadlab and Bashan Geotechnics conducted the field survey programme (including the field excavations, site walkover and general site observations) on 05 September 2019. The purpose of the current geotechnical investigation is to access soil materials, define soil properties and soil behaviour (on site) and to establish the site-specific geotechnical conditions at the proposed project.

4.2.1 General Topography

A site walkover survey was conducted aimed at establishing the site's drainage features and to obtain the site's topographical characteristics. This exercise revealed that the proposed construction site represents a generally moderate to low undulating topography with elevation ranging between 1279 - 1284 m (with an average elevation of 1282 m).

4.3 Dynamic Cone Penetrometer Soundings

Dynamic Cone Penetrometer (DCP) soundings were conducted on site with the aim of obtaining the general depth to bedrock and/or hard rock and to determine the relative density / consistency profile. **Table 4** shows the summarised results of the DCP sounding survey whilst detailed results are depicted in the Appendix attached to this Report.

The DCP soundings were performed on the top of the test pits (prior to the commencement of the excavations) using a 1 m DCP survey tool. Based on the material consistency profiles obtained from the DCP survey, the project site is potentially varied (in terms of hardness and material consistency) on site. In addition, the prevailing soils are generally characterised as having good to moderate insitu AASHTO subgrade rating.

Table 4
Plot 6 - Bloemspruit Residential Townhouse Development Project
Summarised Results – DCP Sounding Survey

DCP Station	From (mm)	To (mm)	Run (mm)	Inferred material Layer	Inferred Material Consistency	Shear Strength (kPa)	Estimated CBR (%)	Bearing Capacity (kPa)	Inferred Excavatability
TP01	0	478	478	Transported Soil	Dense	123 - 156	31 - 46	125	Intermediate to soft
	478	608	130	Reworked Residual Soil	Very dense	173 - 197	53 - 87	125	Intermediate to soft
	608	880	272	Reworked Residual Soil	Dense	109 - 173	25 - 56	110	Intermediate to soft
	880	975	95	Residual Soil	Very dense	> 200	62 - 110	200	Intermediate to hard
TP02	0	29	29	Transported Soil	Dense	156	44	150	Intermediate to soft
	29	128	99	Transported Soil	Very dense	> 200	75 - 110	200	Intermediate to soft
TP03	0	190	190	Transported Soil	Very dense	164 - 200	51 - 110	160	Intermediate to soft
	190	360	170	Transported Soil	Dense	98 - 139	31 - 66	100	Intermediate to soft
	360	498	138	Transported Soil	Very dense	> 200	70 - 110	200	Intermediate to soft
	498	642	144	Residual Soil	Dense	152 - 164	44 - 51	150	Intermediate to soft
	642	957	315	Residual Soil	Very dense	190 - 200	66 - 110	190	Intermediate to hard
TP04	0	429	429	Transported Soil	Dense to very dense	136 - 190	36 - 66	140	Intermediate to hard
	429	673	244	Residual Soil	Dense	94 - 169	19 - 53	100	Intermediate to soft
	673	847	174	Residual Soil	Dense	111 - 164	25 - 51	150	Intermediate to soft
	847	985	138	Residual Soil	Very dense	> 200	86 - 110	200	Intermediate to hard
TP06	0	345	345	Transported Soil	Dense to very dense	105 - 200	23 - 110	100	Intermediate to soft
	345	975	630	Transported Soil	Very dense	> 200	80 - 110	200	Intermediate to hard
TP07	0	305	305	Transported Soil	Dense to very dense	145 - 184	41 - 62	150	Intermediate to soft
	305	570	265	Residual Soil	Dense	136 - 200	36 - 75	140	Intermediate to soft
	570	690	120	Residual Soil	Very dense	> 200	66 - 110	200	Intermediate to soft
	690	752	62	Residual Soil	Dense	89	17	90	Intermediate to soft
TP08	0	145	62	Transported Soil	Very dense	173 - 200	56 - 110	170	Intermediate to soft
	145	414	269	Transported Soil	Dense	87 - 136	17 - 36	90	Intermediate to soft
	414	438	24	Transported Soil	Very dense	179	18	90	Intermediate to soft
	438	969	531	Transported Soil	Medium dense	54 - 85	7 - 16	80	Intermediate to soft
	969	1010	41	Reworked Residual Soil	Dense	121	30	120	Intermediate to hard

The DCP results further indicate that the relative density of the materials found at the proposed project site is relatively variable. In summary, the soil consistency profile of the project site within the top 1 m may be divided into 3 sub-categories (from top to bottom), namely; loose to medium dense, medium dense to dense, and dense to very dense. The above sub-categories further fit into the material consistencies of the observed soil materials recovered in the excavated test pits, namely; transported soils (topsoil / colluvium), reworked residual soils and the residual soils.

The bearing capacity gradually increases with depth but remains variable due to a varying hardness and material compaction. It should be noted that due to some variations in the bearing pressure across the site, **differential settlement** might be experienced on site.

The DCP sounding survey results further indicate that (with all conditions being ideal) and if founded within the dense to very dense soil materials, the site conditions are capable of supporting foundations of **non-settlement, non-sensitive structures** with an estimated average bearing capacity ranging between **80 - 140 kPa**.

The material hardness and/or rippability potentially fall in the hardness category ranging between intermediate to hard excavations. However, both the material strength / hardness and the CBR values are empirical values and depend on such factors as the moisture content (which cannot be determined during the DCP sounding survey).

The above results are therefore an indicative synopsis which need to be verified by further materials testing and/or detailed observations (including the dynamic probe super heavy soundings). Hence, Bashan Geotechnics is of the opinion that the DCP results should be used with caution.

Bashan Geotechnics is of the opinion that these results may only be used with insight into an appreciation of the limitations of the test, especially with respect to the change or variable moisture content of the tested soil materials.

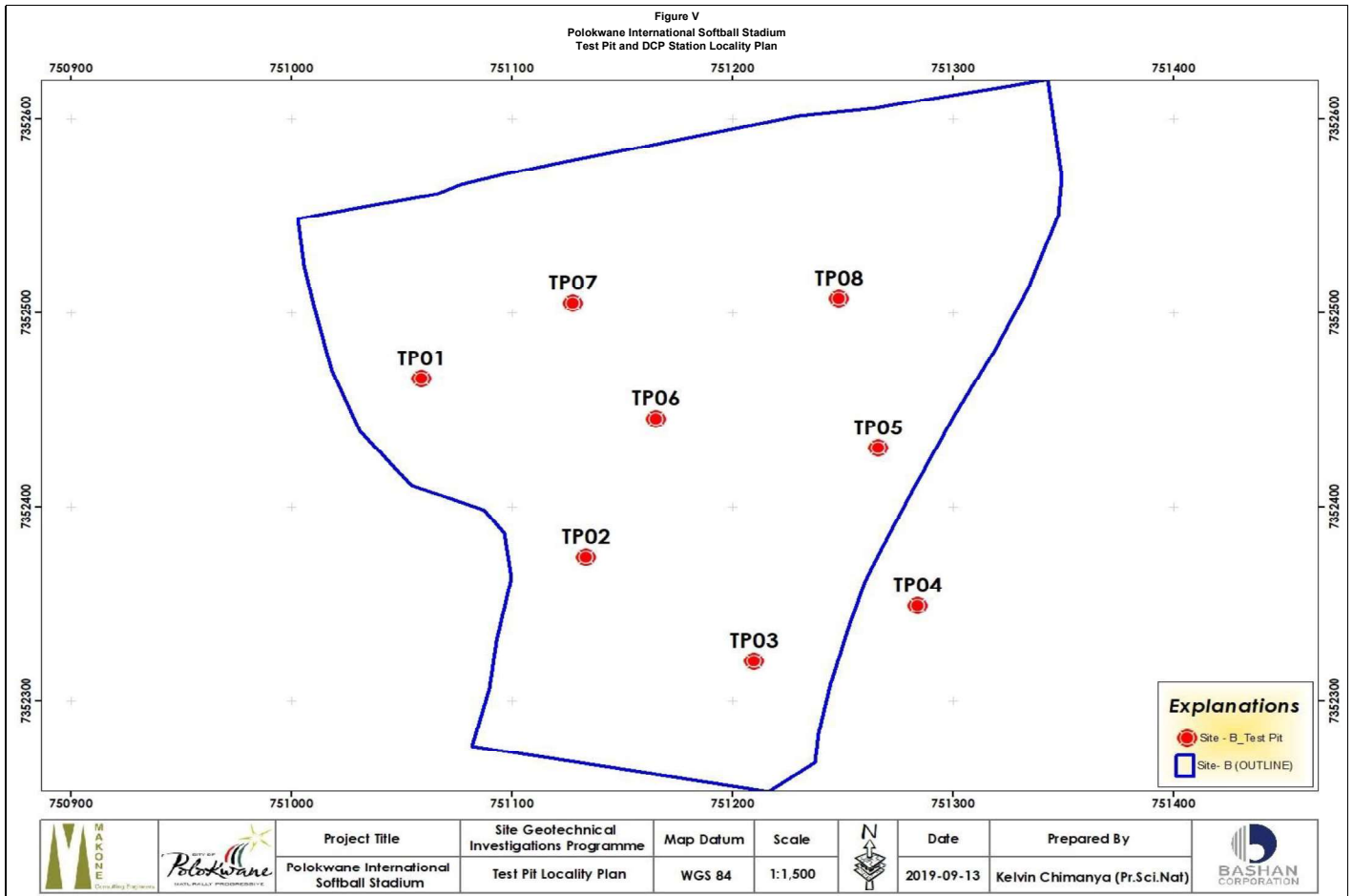
4.4 Test Pit Excavations

During the current field geotechnical survey, twenty (20) test pit positions were carefully chosen (labelled as **TP01 – TP08**) and pegged on the ground using a handheld GPS (Garmin GPSMap 64, set to the WGS84 map datum). The test pit collar positions are shown in **Table 5** whilst **Figure V** shows the general test pit locality plan.

The mode of excavation was via mechanised methods, using a Tractor Loader Backhoe (TLB) and excavating to a target depth of 2.00 – 3.00 m (or at the interception of the country bedrock layer and/or to refusal). In conducting these excavations, emphasis was made on accessing the soil materials found inside the test pit and a detailed study of the test pit sidewalls. TLB refusal was observed at all the test pit positions at various depths ranging between 1.10 - 1.30 m (with an average refusal depth of 1.13 m) below the existing ground surface.

Table 5
Polokwane International Softball Stadium
Test Pit Collar Information

Rank	Date of Excavation	Test Pit Station	DCP Station	Easting (WGS84)	Northing (WGS84)	Elevation (m)	Latitude (South)	Longitude (East)	Total Depth (m)	Shallow Seepage (m)	Refusal (m)	Ground Conditions at Refusal / Reason For Termination
1	05-09-2019	TP01	DCP01	751059	7352466	1279	-23.91975	29.46632	1.10	-	1.10	TLB penetration challenges / refusal
2	05-09-2019	TP02	DCP02	751134	7352374	1281	-23.92057	29.46706	1.30	-	1.30	TLB penetration challenges / refusal
3	05-09-2019	TP03	DCP03	751210	7352321	1283	-23.92104	29.46782	1.20	-	1.20	TLB penetration challenges / refusal
4	05-09-2019	TP04	DCP04	751284	7352349	1284	-23.92077	29.46854	1.00	-	1.00	TLB penetration challenges / refusal
5	05-09-2019	TP05	DCP05	751267	7352430	1282	-23.92004	29.46836	1.20	-	1.20	TLB penetration challenges / refusal
6	05-09-2019	TP06	DCP06	751165	7352446	1281	-23.91992	29.46736	1.10	-	1.10	TLB penetration challenges / refusal
7	05-09-2019	TP07	DCP07	751128	7352505	1280	-23.91939	29.46698	1.00	-	1.00	TLB penetration challenges / refusal
8	05-09-2019	TP08	DCP08	751249	7352508	1282	-23.91935	29.46817	1.10	-	1.10	TLB penetration challenges / refusal



4.5 Soil Profiles

These test pits were profiled (in-situ) with the aim of developing the site stratigraphy, identify seepage behaviour, appraise the slope stability (for excavations purposes) and to sample the different soil profiles and/or horizons (for laboratory testing purposes). In conducting these excavations, emphasis was made on accessing the soil materials found inside the test pit (over the road surface).

All the test pits were profiled by a professional Engineering Geologist using standard guidelines for soil and rock logging. All test pit sidewalls were critically studied along the vertical face of the excavation and an in-situ soil profiling exercise conducted in line with the guidelines promulgated by Jennings et al (1973) and the recommended SAICE guidelines for soil and rock logging. Under these guidelines, various soil horizons identified are comprehensively described using the moisture, colour, consistency, structure, texture and origin (MCCSSO) techniques. In addition, whenever rock is encountered, the rock faces are profiled according to industry best standards and procedures.

The project site is characterised by a variable soil profile across the site. The soil profiles have revealed a variety in the degree of soil composition (and ferruginisation) of the materials found on site. This is partly because of the varied assortment in the mineral and / or alteration of the original, insitu rocks.

Bashan Geotechnics has delineated a minimum of two (02) soil sublayers as the most prevalent on site and these are, **transported soils** (topsoil and colluvium) and the **residual soils** (reworked residual and residual soils). A summarised table of the intercepted soil layer materials is shown in **Table 6**. Detailed soil profiling information is depicted in the **Appendix** attached to this Report.

Table 6 Plot 6 - Bloemspruit Residential Townhouse Development Project Soil Sublayer Thickness Summary													
Test Pit	Transported Soils						Residual Soils						Total Depth (m)
	Topsoil			Colluvium			Reworked Residual			Residual Soil			
	From (m)	To (m)	Run (m)	From (m)	To (m)	Run (m)	From (m)	To (m)	Run (m)	From (m)	To (m)	Run (m)	
TP01	0.00	0.30	0.30	-	-	-	0.30	0.70	0.40	0.70	1.10	0.40	1.10
TP02	0.00	0.50	0.50	-	-	-	0.50	1.00	0.50	1.00	1.30	0.30	1.30
TP03	0.00	0.25	0.25	0.25	0.45	0.20	-	-	-	0.45	1.20	0.75	1.20
TP04	0.00	0.20	0.20	-	-	-	-	-	-	0.20	1.00	0.80	1.00
TP05	0.00	0.30	0.30	0.30	0.80	0.50	-	-	-	0.80	1.20	0.40	1.20
TP06	0.00	0.40	0.40	0.40	1.00	0.60	1.00	1.10	0.10	-	-	-	1.10
TP07	0.00	0.40	0.40	-	-	-	-	-	-	0.40	1.00	0.60	1.00
TP08	0.00	0.20	0.20	0.20	1.00	0.80	1.00	1.10	0.10	-	-	-	1.10

4.5.1 Transported soil

Transported soil is the material that has been transported by a natural agent (water, wind or gravity) during relatively recent geological times and which has not yet undergone lithification into a sedimentary rock or cementation into a pedogenic material. The transported soils on site are defined by both a topsoil and a coarse to fine colluvium.

- **Topsoil:** The topsoil is characterised as a dry, pale to dark reddish brown, loose to medium dense and ranges from being a **silty sandy gravel** to **silty sand**. It is comprised of a varied mixture of a top zone of undifferentiated soil materials (with minor portions of fill) and a lower zone of coarse to fine colluvium. It is observed to be associated with minor organics (plant roots) in the top 100 mm and the lower boundary between the topsoil and the underlying soil materials is arbitrary.

Observed at all the eight (08) test pit positions upto a maximum depth of 0.50 m (below the existing ground surface), the average depth of this soil material sublayer is about 0.32 m. The topsoil material is defined as being compressible and potentially collapsible soil. Due to its collapsible potential, it is our opinion that the topsoil should be spoilt and replaced with a suitable layer of soil prior to the commencement of the construction phase.

- **Colluvium:** These soils are observed at four (04) test pit positions (TP03, TP05 – TP06, and at TP08) between the depths of 0.20 – 1.00 m (below the existing ground surface). The colluvial layer has an average depth of 0.53 m.

It is generally described as a dry, dark brown to reddish orange (with mottled colours of olive, orange, yellow and black), loose to medium dense, fine grained, intact soils that are comprised of other materials such as **silty sandy gravels**, **sandy gravels** and **silty clayey sands**. These materials on site show characteristic signs of being a mixture of both the granular and cohesive soils and as such, some thin to medium bands of cohesive soils should be expected at some localities. In addition, these soil materials are defined as being compressible and potentially collapsible.

4.5.2 Residual soil

This is the material formed by the in-situ decomposition (chemical weathering) or disintegration (mechanical weathering) of a rock. It is often subdivided into two (02) main subcategories (on site), namely, the Reworked Residual and the Residual Soil. Immediately below the Residual soil is often hard bedrock of the country rocks and/or dolerite sills.

- **Reworked Residual:** This is the soil horizon where both the macro-structures (joints, bedding planes) and microstructures (mineral grain boundaries) have been destroyed by biotic action. This soil layer has been observed at four (04) test pit localities (TP01 - TP02, TP06 and TP08) between the depths of 0.30 – 1.10 m (below the existing ground surface) and has an average depth of 0.98 m.

The Reworked Residual soil prevalent at the site can be described as a dry, pale olive to reddish brown (often with mottled colours of orange, yellow, pink), medium dense to dense, fractured, **silty to sandy gravels**.

- **Residual Soil:** The residual soil layer is the soil horizon where both the macro and microstructures inherited from the parent rock remain intact (and visible). At the project site, this soil layer has been observed at six (06) test pit localities (TP01 – TP05 and TP07) between the depths of 0.20 – 1.20 m (below the existing ground surface) and has an average depth of 0.54 m.

The Residual soil component on site can be described as a dry, pale reddish orange (with mottled colours of grey, yellow and cream), dense to very dense, fractured, **silty gravelly sands**, **sandy gravels** and **gravelly silty sands**.

4.6 Bulk Sampling and Engineering Materials Testing

Sufficient visual information was gathered during the soil profiling with the aim of carrying out detailed assessment and to aid in deducing a multi-disciplinary based geotechnical overview of the project. In order to confirm the visual assessments of the engineering properties of the soils, about twenty (20) disturbed soil samples were collected during the field investigations on site and submitted to the Roadlab Laboratories, a SANAS accredited engineering materials testing laboratory based at Germiston (Gauteng).

The collected soil samples are the ones which were deemed as being representative of the soil materials (prevalent on site) and these were then subjected to classification tests with the results being used to establish the engineering materials (via laboratory testing). In order to assess the geotechnical properties of the founding soil strata and their suitability for use as backfill materials (for construction) the following laboratory tests were performed on the soil samples submitted to the Roadlab laboratory.

4.6.1 Index Tests

Particle size grading of the soils or sieve analysis is the easiest way to describe the relative amounts of gravel, sand, silt and clay within the soil. The specific water contents where the nature of a soil changes (e.g. from solid to semisolid), are known as the Atterberg limits.

Atterberg Limits are conducted to determine the basic engineering properties of the soils and aid the soil engineering characterisation or classification. The Shrinkage Limit (SL) refers to transition from a solid to a semisolid state. The Plastic Limit (PL) refers to transition from a semisolid to a plastic state and the Liquid Limit (LL) the transition from a plastic to a liquid state. The Plasticity Index (PI) is the difference in moisture content between the liquid and the plastic limit.

4.6.2 Modified AASHTO Subgrade Rating

The suitability of the near surface soil materials on site for road construction purposes can be inferred from the modified version of the American Association of State Highway and Transportation Officials (MOD AASHTO) and the Technical Recommendations for Highways (TRH) soil classifications.

Also referred to as the Road Indicator Tests or the compaction tests, these tests are comprised of the Modified AASHTO moisture / density relationships and the California Bearing Ratio (CBR) values. These tests are often used to evaluate the compaction characteristics of the site soils and permit a thorough evaluation of their suitability for use (as construction materials). Summarised road indicator tests (Mod AASHTO subgrade rating) results are depicted in **Table 7**.

4.6.3 Foundation Indicators

Performed in order to determine the basic soil classification parameters in terms of the potential expansiveness and to predict their re-use potential during construction. Summarised foundation indicator test results are depicted in **Table 8** and all the detailed laboratory test results are included in the Appendix attached to this Geotechnical Report.

4.6.4 Soil Aggressiveness

Corrosion is an electrochemical process whereby metals are changed and electrical energy is released. Soils that are exposed to construction materials may be corrosive to either concrete or reinforced steel and when this occurs, it can lead to failure of the structure. Generally, the corrosion of metallic pipefittings and other construction materials will be negatively influenced by a low pH and high electrical conductivity (EC).

To determine the corrosive potential of the soils and associated groundwater towards buried ferrous services. Summarised results of the chemical soil aggressiveness are depicted in **Table 9**.

Table 7
Polokwane International Softball Stadium
Modified AASHTO Subgrade Rating – Summarised Results

Trial Pit	From (m)	To (m)	Run (m)	Material Sublayer	Material Description	LL (%)	PI (%)	LS (%)	GM	OMC (%)	MDD (kg/m ³)	Comp (MC)	CBR Swell (%)	CBR @ 100% Comp	CBR @ 98% Comp	CBR @ 97% Comp	CBR @ 95% Comp	CBR @ 93% Comp	CBR @ 90% Comp	HRB Class	TRH 14
TP01	0.70	1.10	0.40	Residual Soil	Silty Gravelly Sand	51	17	8.6	1.69	12.3	1904	12.1	0.34	38	28	22	12	9	5	A-7-5(0)	G9
TP02	0.50	1.00	0.50	Reworked Residual Soil	Sandy Gravel	29	12	5.5	2.15	6.4	2109	6.2	0.23	13	12	11	10	9	8	A-2-6(0)	G9
TP03	0.45	1.20	0.75	Residual Soil	Silty Sandy Gravel	29	12	5.6	2.10	9.2	2168	9.0	0.26	18	14	11	7	6	5	A-2-6(0)	G9
TP04	0.20	1.00	0.80	Colluvium	Sandy Gravel	33	13	6.3	2.21	8.2	2093	8.0	0.27	5	4	3	2	2	1	A-2-6(0)	G10
TP05	0.80	1.20	0.40	Residual Soil	Sandy Gravel	33	12	5.6	2.19	6.8	2091	6.6	0.23	8	8	7	7	5	3	A-2-6(0)	G10
TP06	0.40	1.00	0.60	Colluvium	Silty Clayey Sand	29	9	4.0	0.90	10.4	1947	10.2	0.35	3	3	2	2	2	2	A-4(0)	G10
TP07	0.40	1.00	0.60	Residual Soil	Sandy Gravel	40	8	3.8	1.85	11.3	1842	11.1	0.30	34	27	23	16	14	11	A-2-4(0)	G8
TP08	0.20	1.00	0.80	Colluvium	Clayey Silty Sand	32	15	6.6	0.94	15.3	1852	15.1	0.38	6	5	5	4	3	2	A-2-6(0)	G10

LL = Liquid Limit
PI = Plasticity Index
LS = Linear Shrinkage
PL = Plasticity Limit
OMC = Optimum Moisture Content
MDD = Modified Dry Density
GM = Grading Modulus
NP = Non-plastic
SP = Slightly plastic
Clay = 0.001 – 0.002 mm
Silt = 0.002 – 0.06 mm
Sand = 0.06 – 2.00 mm
Gravel = 2.00 – 60.0 mm

Granules = 2 – 4 mm
Pebbles = 4 – 64 mm
Cobbles = 64 – 256 mm
Boulders = > 256 mm
CBR = California Bearing Ratio
HRB = Highway Research Board
COTO = Committee of land Transport Officials
AASHTO = American Association of State Highway and Transportation Officials
USCS = Unified Soil Classification System
PI (wt.) = Plasticity Index of whole sample (weighted).

GW = Well graded gravels, gravel sand mixtures (little or no fines)
GP = Poorly-graded gravels, gravel-sand
GM = Silty Gravels
GC = Clayey Gravels, gravel-sand-clay mixtures
SW = Well graded sands, gravelly sands (little or no fines)
SP = Poorly graded sands, gravelly sands (little or no fines)
SM = Silty sands, sand-silt mixtures
SC = Clayey sands, sand-clay mixtures
MH = Inorganic silts, micaceous or diatomaceous, fine sandy or silty soils, elastic silts
ML = Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity
CL = Inorganic silts, micaceous or diatomaceous, fine, sandy or silty soils, elastic silts
CH = Inorganic clays of medium to high plasticity, fat clays
OL = Organic silts and organic silt-clays of low plasticity
OH = Organic clays of medium to high plasticity, organic silts.
PT = Peat and other highly organic soils.

Table 8
Polokwane International Softball Stadium
Summary of the Foundation Indicator Tests

Trial Pit	From (m)	To (m)	Run (m)	Material Sublayer	Soil Description	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Wtd PI (%)	LL (%)	PI (%)	LS (%)	PI < 0.075 mm (%)	Unified Soil Class	Potential Expansion	Surface Heave (mm)	Vertical Heave (mm)
TP01	0.70	1.10	0.40	Residual Soil	Silty Gravelly Sand	6.6	10.2	42.3	41.0	8.0	51	17	8.6	47	6.58	0.34	SM	Low
TP02	0.50	1.00	0.50	Reworked Residual Soil	Sandy Gravel	6.5	7.2	26.3	60.0	3.7	29	12	5.5	31	6.51	0.23	GC	Low
TP03	0.45	1.20	0.75	Residual Soil	Silty Sandy Gravel	4.4	16.6	27.0	52.0	3.5	29	12	5.8	28	6.44	0.26	SC	Low
TP04	0.20	1.00	0.80	Colluvium	Sandy Gravel	6.4	4.9	26.7	62.0	3.6	33	13	6.3	28	6.44	0.27	GC	Low
TP05	0.80	1.20	0.40	Residual Soil	Sandy Gravel	4.6	5.6	28.8	61.0	3.2	33	12	5.6	27	4.59	0.23	GC	Low
TP06	0.40	1.00	0.60	Colluvium	Silty Clayey Sand	22.8	13.0	60.2	4.0	6.8	29	9	4.0	76	22.80	0.35	SC	Low
TP07	0.40	1.00	0.60	Residual Soil	Sandy Gravel	5.1	8.2	42.8	44.0	3.1	40	8	3.8	39	5.07	0.30	SM	Low
TP08	0.20	1.00	0.80	Colluvium	Clayey Silty Sand	14.8	15.5	65.7	4.0	11.7	32	15	6.6	78	14.82	0.38	SM	Low

LL = Liquid Limit
PI = Plasticity Index
LS = Linear Shrinkage
PL = Plasticity Limit
OMC = Optimum Moisture Content
MDD = Modified Dry Density
GM = Grading Modulus
NP = Non-plastic
SP = Slightly plastic
Clay = 0.001 – 0.002 mm
Silt = 0.002 – 0.06 mm
Sand = 0.06 – 2.00 mm
Gravel = 2.00 – 60.0 mm

Granules = 2 – 4 mm
Pebbles = 4 – 64 mm
Cobbles = 64 – 256 mm
Boulders = > 256 mm
CBR = California Bearing Ratio
HRB = Highway Research Board
COTD = Committee of land Transport Officials
TRH = Technical Recommendations for Highways
AASHTO = American Association of State Highway and Transportation Officials
USCS = Unified Soil Classification System
PI (wt.) = Plasticity Index of whole sample (weighted).

GW = Well graded gravels, gravel sand mixtures (little or no fines)
GP = Poorly-graded gravels, gravel-sand
GM = Silty Gravels
GC = Clayey Gravels, gravel-sand-clay mixtures
SW = Well graded sands, gravelly sands (little or no fines)
SP = Poorly graded sands, gravelly sands (little or no fines)
SM = Silty sands, sand-silt mixtures
SC = Clayey sands, sand-clay mixtures
MH = Inorganic silts, micaceous or diatomaceous, fine sandy or silty soils, elastic silts
ML = Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity
CL = Inorganic silts, micaceous or diatomaceous, fine, sandy or silty soils, elastic silts
CH = Inorganic clays of medium to high plasticity, fat clays
OL = Organic silts and organic silt-clays of low plasticity
OH = Organic clays of medium to high plasticity, organic silts.
PT = Peat and other highly organic soils.

4.7 Chemical Reactive Soil Status

Corrosion of metallic fittings and other construction materials is likely to be negatively impacted by low pH and high conductivity (indicating a high concentration of dissolved salts in the soils).

Two (02) disturbed soil samples collected at four (04) test pit stations (TP01, TP03, TP05 and TP08) were selected for pH and EC testing in order to measure the corrosivity of the soil. The summarised results of the electrical conductivity and corrosivity analysis are depicted in **Table 9**. Detailed chemical results are attached to the Appendix attached to this Report.

Table 9 Mrs. Nonawuli Gqwabe Family House Site Chemical Parameters Testing Summarised Results								
Test Pit Station	From (mm)	To (mm)	Run (mm)	Soil Material Sublayer	Conductivity (mS / m)	Soil Corrosivity Aggressiveness	pH Value	Soil Acidity Status
TP01	700	1100	400	Silty Gravelly Sand	46.0	Highly corrosive	8.37	Moderately alkaline
TP03	450	1200	750	Silty Sandy Gravel	28.0	Medium corrosive	7.08	Slightly acidic
TP05	800	1200	400	Sandy Gravel	39.0	Medium corrosive	6.74	Slightly alkaline
TP08	200	1000	800	Clayey Silty Sand	45.0	Highly corrosive	6.74	Slightly alkaline

The laboratory results of the conducted on the soil materials indicate that the pH values for the insitu soil materials range between 6.74 – 8.37. This indicates that the soil's pH condition is generally defined as being slightly acidic to slightly and moderately alkaline.

In addition, the soil's conductivity values range between 28 – 46 millisiemens per meter (mS/m). This indicates that the soil materials found on site are characterised as being **moderately** to being **highly corrosive** (towards metal, concrete and fibre).

It should be pointed out that soluble sulphate in the irrigation water supply and/or the use of fertiliser may cause the sulphate content in the surficial soils to increase significantly with time. Should this occur, it could result in a higher sulphate exposure than that indicated by the test results reported here-in. Hence, Bashan Geotechnics is of the opinion that strict precautionary measures shall be required to be observed during the construction stage of the housing structure.

5 SITE ENGINEERING MATERIALS EVALUATION

5.1 General Stratigraphy and Material Classification

The final geotechnical assessments contained in this Technical Report are based on the results of a desktop study, reconnaissance survey, trial pitting and a DCP sounding survey, coupled with results and the detailed interpretation of the engineering materials testing at an accredited laboratory.

Regionally within the project area, the depth to bedrock is highly variable, being dependent on the topography, surface lithologies, structural controls and the weathering profile. The average overburden (soils) thickness is approximately 7 m whilst the depth of weathering (depth to saprolite) is estimated between 15 – 50 m.

The results of the test pit excavations (coupled with the results of the DCP and DPSH surveys) have revealed a variety in the degree of soil composition (and ferruginisation) of the materials found on site. This is partly because of the varied assortment in the mineral and / or alteration of the original, insitu rocks.

Bashan Geotechnics has delineated a minimum of four (04) soil horizons on site, namely; **topsoil** (0.00 – 0.60 m); **Colluvium** (0.20 – 0.90 m), **Reworked Residual** (0.20 – 1.80 m) and, **Residual soils** (0.30 – 1.40 m). In addition, a dense, weakly to moderately weathered bedrock (saprock) of metamorphic rocks assigned to the Mothiba Formation (**Zpm**) of the Pietersburg Group may exist with depth.

Table 10
Polokwane International Softball Stadium
General Site Stratigraphy – Average Depth Profiling

Soil Layer	From (m)	To (m)	Run (m)	Material Origin	Soil Layer Type	General Material Consistency	Safe Bearing Capacity (kPa)	Anticipated Excavatibility
1	0.00	0.50	0.50	Transported	Topsoil	Loose to medium dense	15 - 35	Soft
2	0.20	1.00	0.80	Transported	Colluvium	Loose to medium dense	35 - 60	Soft
3	0.30	1.10	0.80	In-situ	Reworked Residual	Medium dense to dense	60 - 100	Intermediate to soft
4	0.20	1.30	1.10	In-situ	Residual Soil	Dense to very dense	100 - 140	Intermediate to hard

5.1.1 Topsoil

The topsoil is comprised of a mixture of various transported soil materials (with portions of fill). The topsoil layer was not selected for laboratory testing and material classification but field indications point to these soils as being highly compressible with a collapsible grain structure.

The NHBRC site class for these soils is **C**. However, it is our opinion that these soil materials should not be used as construction materials and should thus be spoilt prior to the commencement of the construction phase.

5.1.2 Coarse Colluvium

Index tests performed on three (03) soil samples collected from this horizon have revealed that these soil materials are comprised of compressible and potentially collapsible soils. They are comprised of silty gravelly sands and/or sandy gravels of marginally low plasticity index. On average, the colluvial soils are predominantly comprised of **sand** (50.9%), **gravel** (23.3%), **silt** (11.1%) and **clay** (14.7%) and are described as silty sands / sand-silt mixtures (**SM**), clayey sands / sand-clay mixtures (**SC**) and clayey gravels / gravel-sand-clay mixtures (**GC**) on the Unified Soil Classification (USC) system. These soils generally plot as ranging between A-2-6(0) to A-4(0) on the HRB scale and as such they are associated with a very good to good permeability rating.

These soils have a grading modulus (GM) ranging between 0.90 – 2.21 (with an average of 1.35) and an optimised moisture content (OMC) ranging between 8.2 – 15.3 (with an average of 11.3). In addition, these colluvial soils portray a maximum dry density (MDD) ranging between 1852 – 2093 kg / m³ (with an average of 1964 kg / m³) and a compaction (MC) rating ranging between 8.0 – 15.1 (with an average of 11.1).

These soil materials are also associated with a low to medium CBR rating at 95% Modified AASHTO density ranging between 2 – 4 (with an average of 3) and generally classify as ranging between **G10** (on the TRH 14 classification system).

These soils potentially **compressible** and **collapsible** but are associated with a **low potential expansion** and as such, they were not evaluated for their heave classification. The NHRBC site class for areas covered by these colluvial soils is **H / C**. In addition, should a decision be made to use the colluvium for construction purposes (based on the available volumes and tonnages), then these will have to be compacted prior to being used as construction materials on site.

5.1.3 Reworked Residual Soil

Index tests performed on a single (01) soil sample collected from this layer horizon have revealed that these soil materials are (on average) comprised of silty to sandy gravels of marginally low plasticity index. On average, the reworked residual soils are predominantly comprised of **gravel** (60.0%), **sand** (26.3%), **silt** (7.2%) and **clay** (6.5%) and are described as silty gravels (**GM**) on the Unified Soil Classification (USC) system.

On the HRB plot, these soils generally fit on A-2-6(0) on the HRB scale and as such, they are associated with a good permeability rating. These soils have a grading modulus (GM) ranging of 2.15 and an optimised moisture content (OMC) of 6.4.

In addition, the reworked residual soils portray an average maximum dry density (MDD) of 2109 kg / m³ and a compaction (MC) rating of 6.2. Based on the obtained MDD results and coupled with various site observations, it is evident that if collapse settlement were to occur, it would be minimal. The characteristic CBR swell has been established at 0.23%. These soil materials are also associated with a low to medium CBR rating of 10 (at 95% Modified AASHTO density) and generally classify as **G9** (on the TRH classification system).

However, these soils have a marginally **low potential expansion** and as such, they were not evaluated for their heave classification rating. The NHRBC site class for areas covered by these colluvial soils is **H / S**. In addition, should the available quantities (volumes and tonnages) be sufficient, the materials from the reworked residual layer may be used as construction materials on site (as long as compaction rating are sufficient).

5.1.4 Residual Soil

Index tests performed on four (04) soil sample collected from the Residual soils have revealed that these soil materials are similar to the Reworked Residual soils. The Residual soils are predominantly comprised of **gravel** (49.5%), **sand** (35.2%), **silt** (10.2%) and **clay** (5.2%) and are described as **GM** on the Unified Soil Classification (USC) system.

On the HRB plot, these soils generally fit between A-2-4(0) to A-7-5(0) on the HRB scale and as such, they are associated with a fair to low permeability rating. Due to a generally higher MDD result ranging between 1842 – 2168 (with an average of 2001 kg / m³) and coupled with site observations, it is presumed that minimal settlement should be expected.

These soil materials are associated with a marginally low CBR rating ranging between 7 – 16 (at 95% Modified AASHTO density) and generally classify as ranging **G8 – G10** (on the TRH 14 classification system).

The Residual soils have a marginally **low potential expansion** and as such, they were not evaluated for their heave classification rating. The NHRBC site class for areas covered by these colluvial soils is **H - S**. Should the available quantities (volumes and tonnages) be sufficient, then the materials from the reworked residual layer should be used as construction materials on site.

5.2 Geotechnical Classification

The major different engineering geological classifications that could potentially pose direct engineering-related problems and/or fatalities at the proposed site are reviewed and compared to the typical geotechnical constraints for development. Generally, the project site shows a strong affinity to the following site geotechnical conditions depicted in **Table 11**.

Table 11 Polokwane International Softball Stadium Geotechnical Classification for Development			
Geotechnical Constraint		Site Condition	Severity Class
A	Collapsible Soil	Low to moderate potential of collapsible soils anticipated	1
B	Seepage	No water seepage was encountered on site	1
C	Active soil	Marginally Low to medium soil heave anticipated	1
D	Highly compressible soil	Marginally low to moderate soil compressibility anticipated	1 / 2
E	Erodibility of soil	Low risk	1
F	Difficulty of excavation to 1.5 m depth	Hard bedrock interception likely	1 / 2
G	Undermined ground	Site is not undermined	1
H	Instability in areas of soluble rock	Site is not underlain by dolomite bedrock	1
I	Steep slopes	Slopes between 1° - 5°	1
J	Areas of unstable natural slopes	Low risk	1
K	Areas subject to seismic activity	Low risk	1
L	Areas subject to flooding	Site is not adjacent to drainage features	1

5.3 Geotechnical Risk Assessment

The bearing capacity within soft clay material or unconsolidated soil materials can result in loss of stability or potential collapse of structures during the construction phase of the development.

Table 12 highlights some of the probable geotechnical constraints at the project.

Table 12 Polokwane International Softball Stadium Geotechnical Classification for Development	
Constraint	Explanation
Settlement of existing foundations and structures	-Transported soils are often associated with clayey and silty deposits, which are typically poorly consolidated and un lithified. These deposits may settle if unsupported or overloaded. - The presence of localised, un-engineered fill material may also result in a differential settlement hazard. Dependent on the state of weathering, localised areas of extremely weathered granite may result in differential settlement of overlying clays.
Slope stability	- Although project area is a relatively low gradient, transported and residual soils from the weathered bedrock can be susceptible to shallow soil failure (soil creep, slumping, collapse) in areas of increased gradient.
Bearing capacity	- The bearing capacity within soft, silty to clayey soil materials or unconsolidated alluvial material can result in loss of stability or potential collapse of structures during the construction phase of the development and proper considerations of the bearing capacity of the foundations is critical.
Shrink swelling	- Clay derived from Basement bedrock (such as granite) is potentially moderately- to highly-reactive and subjective to considerable shrinkage or swelling (in response to changes in moisture). Highly expansive clay can cause unexpected ground movements that are able to cause damage to the road infrastructure and/or building structures.
Erosion	- During flood events, local creeks may serve as drainage channels for storm water resulting in erosion of soft sediment and bedrock.

Fatal geotechnical flaws which would limit the existing development may be caused by the following key issues: -

- Expansive clays (active or swelling) cause damage due to continual heave and shrinkage.
- Collapsible soils (settling of soil) causing damage due to differential settlement.
- Erodible or dispersive soils cause damage due to erosion of colloidal particles
- Highly compressible or soft soils cause damage due to continual heave and shrinkage
- Pedogenic materials causing problems due to variable conditions.
- Steep slopes and unstable natural slopes causing problems due to variable conditions
- Groundwater levels and seepage
- Surface water inundation or flooding
- Excavability
- Sinkhole formation and subsidence
- Undermined areas
- Seismicity

5.4 Project Site Classification

5.4.1 Collapsible and Compressible Soils

The transported soils exhibit typical characteristics associated with collapsibility and potential compressibility. Collapsible soils can withstand relatively large imposed stresses with small settlements at low insitu moisture content, but this can increase rapidly when saturation wetting occurs under loaded (house) conditions.

According to Rogers (1995), a collapsible soil is one in which the constituent parts have an open packing and which forms a metastable state that can collapse to form a closer packed, more stable structure of significantly reduced volume. Soil collapse can occur in any open-textured, clayey to silty sandy soils, with a high void ratio and generally low in-situ dry density.

A collapsible fabric is normally associated with an open textured, low-density soil (the transported soils) whose individual grains are separated by a bridging material. Highly expansive clay can cause unexpected ground movements that are able to cause damage to the road infrastructure and / or building structures.

Soil collapse can occur in any open-textured, clayey to silty sandy soils, with a high void ratio and generally low in-situ dry density. Collapsible soils will experience settlement upon saturation from an external source. This settlement will take place rapidly if the soil is free draining and gradually if it is not free draining. Damage caused by heave / shrinkage movements differs from that due to collapse or consolidation settlements.

The NHBRC Site class for areas covered with colluvium is **H - C** and founding in these soil materials will require **pre-compaction** of the foundation excavations (with stiffened soil rafts and / or reinforced structures).

5.4.2 Potential Settlement

The potential of experiencing soil settlement due to the consolidation of soils resulting from imposed loads in the soils is generally considered **low**. However, the materials in the upper parts of the transported soil profiles are associated with a potential soil settlement that could result from imposed structural loads. The NHBRC Site class for areas covered with colluvium is **S – C**.

5.4.3 Active Clays

Expansive or active clays are notorious for the damage caused to structures by their changes in volume with fluctuating moisture conditions. When a road or building structure is constructed over expansive soils, these volume changes can cause extensive structural deformation and / or cracking of the road pavement or structure.

Heaving is the process that accompanies the wetting of active soils above a deep water table with a change in volume. The activity of a soil (i.e. its susceptibility to volume change upon changes in the moisture content) is the ratio of the plasticity index (PI) to the clay fraction.

Substantial shrinkage (the reverse process) can occur when the water table is lowered under drought conditions, a scenario that is likely to produce differential settlement in buildings. By far the most commonly used method for assessing heave potential for light buildings remains that devised by Van der Merwe (1964) and revised by Savage (2007).

Expansive soils undergo volume changes upon the wetting and drying of the soil horizons. Highly expansive clay can cause unexpected ground movements that are able to cause damage to road infrastructure and building structures. Whenever a structure is built on clay soils, the problem of heave leads to structural defects and engineering failure at most sites.

If thick active clays are observed on site and if no precautions are taken to reduce differential movements or to prevent conditions promoting potential movements from occurring, such movements will result in damage throughout the structure (the severity of the damage being greatest in the external walls). Damage also occurs internally in the central portions of the structure (depending on the moisture content of the soil preceding construction). Cracks will also alternately open and close as a result of seasonal and climatic changes in the water content of the soil.

The potential volume change (expansiveness) of the soils found at the proposed construction site is considered **marginally low** and thus, potential heaving should not be anticipated. The NHBRC Site class for areas covered with residual soils is **H**.

5.4.4 Erodibility Potential

No evidence of erosion (such as gulleys and erosional channels) was observed on site during the site investigations and Bashan Geotechnics is of the opinion that the materials found at the project site have a very **low** erodibility potential.

Bashan Geotechnics recommend that adequate precautions be considered during the construction phase as certain cohesive soils are likely to be generated and may generally cause problems associated with erodible / slippery conditions.

5.4.5 Undermined Ground

Although the proposed construction site is located within the vicinity of a mining operation, the side effects of undermining are not likely to cause negative geotechnical impacts associated with mining activities. Therefore, the proposed construction site is not shallowly undermined and as such, there is **no risk** of surface settlements that may be caused by mining activities.

5.4.6 Sinkhole Formation

Based on the data extracted from the published, regional geological map, the site is set upon an area that is **not** potentially underlain by dolomite bedrock at depth. In using both the National Home Builders Registration Council (NHBRC) and the Council for Geoscience (CGS) land classification guidelines, the proposed project site is classified as **non-dolomite land**.

5.4.7 Soil Permeability and Flooding

The majority of the soils found at the proposed site are predominantly fine grained, granular soils. The soils are generally associated with good permeability aspects and as such, it is highly anticipated that erosion of the exposed surface will be **low**.

Drainage of surface water would therefore need proper consideration. Shaping of the ground will be required to improve drainage and encourage run-off. In addition, deep stormwater and sewer lines will probably be required in many areas to ensure that the pipelines have an adequate fall.

5.4.8 Shallow Seepage

Shallow seepage was not observed at any of the test pit localities. It must be noted however, that the test pits were excavated during the dry, season when evaporation is generally high and rainfall often very low.

The residual soil materials are moderately to fairly porous making it easier for water infiltration to occur in these soil horizons as well. Seepage and the presence of perennial fluctuations of ground water (if encountered on site) should provide an indication that precautions guiding damp proofing of the proposed structure will have to be strictly adhered to. Hence, Bashan Geotechnics is of the opinion that special care will be required during the construction phase so as to protect the walls from water infiltration.

5.4.9 Steep Stability

The proposed project site is characterised by a relatively flat topography. Field observations have revealed that slope angles at the proposed construction site are less than 4°. Based on a review of available information (coupled with the results of the site walkover), no indication of the presence of unstable natural slopes is associated with the proposed construction site. However, the relatively flat topography may cause drainage problems as it is likely to promote the ponding of water in the project area.

No major slope failures have been recorded within the project area on a regional scale and thus the probability of any mass movement events (such as landslides, mudslides, debris flows, rock falls, rockslides etc.) occurring at the proposed construction site is very low. In addition, the sidewall stability had remained stable at all the test pit locality sites during the duration of the field investigations and hence, the site generally offers sidewall stability across the site.

5.4.10 Excavatibility

Difficulty of excavation or excavatibility generally occurs where shallow bedrock and/or pedocretes are encountered within the top 1.50 m depth of the soil profile or where TLB refusal occurs (whichever is first). The site category falls within the soft to intermediate excavations.

However, hard excavations involving areas underlain by moderately weathered bedrock (granite and foliated rocks) could be expected at depths greater than 2.00 m. A combined use of a pick and / or shovel with TLB mechanical excavation operations will be adequate to excavate through the site soils (albeit upto a suitable founding material for single storey structures). Deeper service trenches within shallow bedrock will require hard ripping with powerful excavators.

6 GEOTECHNICAL RECOMMENDATIONS

6.1 Geotechnical Site Class Zonation

The site classes shown in **Table 13** (below) are based on the assumption that differential movements (experienced by single-storey residential structures), expressed as a percentage of the total soil movements are approximately equal to 50% for soils that exhibit expansive or compressive characteristics and 75% for soils that exhibit both compressible and collapse characteristics. The site classifications (C, H, R, P and S) are devised to categorise areas when assessing the geotechnical parameters of a construction site.

Table 13 Polokwane International Softball Stadium Residential Site Class Designation Classes				
Typical Founding Material	Founding Material Characteristics	Expected Total Soil Movement Range (in mm)	Assumed Differential Movement (% of Total)	Site Class
Rock (excluding mudrocks as they exhibit swelling at depth)	STABLE	NEGLIGIBLE	-	R
Fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays)	EXPANSIVE SOILS	< 7.5	50	H
		7.5 - 15	50	H1
		15 - 30	50	H2
		> 30	50	H3
Silty sands, sands, sandy and gravelly soils	COMPRESSIBLE AND POTENTIALLY COLLAPSIBLE SOILS	< 5	75	C
		5 - 10	75	C1
		> 10	75	C2
Fine grained soils (clayey silts and clayey sands of low plasticity), sands, sandy and gravelly soils	COMPRESSIBLE SOILS	< 10	50	S
		10 - 20	50	S1
		> 20	50	S2
Contaminated soils; Controlled fill; Dolomitic areas; Landslip; Landfill; Marshy areas; Mine waste fill; Mining subsidence; Reclaimed areas; Uncontrolled fill; Very soft silts/silty clays	VARIABLE	VARIABLE	-	P

NHBRC has proposed a residential development classification based on the type and severity of the geotechnical problems and the likely impacts they would cause to the founding solutions required to solve the problems. It should be noted that conformance to the NHBRC guidelines in respect of the foundation design and building procedures is required. Due the likelihood of intersecting bedrock on site the Design Engineer should approve all modifications relating to foundation designs (if required).

The proposed site classification indicates that the proposed site falls within **Zone 1** which refers to the most favourable site and where normal development can take place without considering precautionary measures. However, a low to moderate likelihood thus exists for collapse potential should there be a sudden ingress of water resulting in saturation of the foundation soils. This may occur should services adjacent to walls and foundations rupture or crack, or if water is allowed to pond against the walls of the structure.

Based on the available geotechnical data, Bashan Geotechnics is of the opinion that, the recommended NHBRC Site Class for areas containing the residual soils at the project is **H – S. - C**

6.2 Foundation Assessment

A detailed foundation design falls outside the scope of the current geotechnical investigations. It should be noted that all larger, commercial or multi-storey structures require site-specific design parameters that are not catered for via the current shallow pitting (and the accompanying routine soil testing) as performed during the current Geotechnical Investigation.

Foundation movements on problem soils are normally associated with changes in moisture content. Hence, appropriate surface and subsurface drainage will be required in all areas, especially where the subgrade material is comprised of impermeable clayey soils. This will be done the aim of preventing the artificial development of a perched water table under the road surface. However, non-uniform or differential movements cause structural distress, deformations and overstressing of structural components, resulting in the occurrence of damage to the structures.

6.2.1 Structural Founding for Single Storey Building

In addition, we strongly recommend that a Competent Person should be invited to site during the construction phase of the project with the idea of checking on, and to confirm all foundation excavations prior to the reinforcing and concrete placement. It is also important to ensure that all founding solutions employ appropriate services and/or drainage measures.

- **Proposed Founding Depth:** Based on the findings of the current geotechnical investigations for a simple (single-storey) building, a founding depth at the project site should be **0.80 m** (below the existing ground surface). It is our opinion that the top of the Residual soil layer should be considered as a suitable founding medium for the proposed structure. However, Bashan Geotechnics is of the opinion that the soils above the residual soils should first be removed and replaced with a proper fill material.

Foundations should be laid on top of the surface of a properly-prepared fill. Proper compaction of the classified fill material in layers not exceeding 200 mm (where mechanical equipment is to be used) or 100 mm (where handheld compactors are to be used) must take place for all foundation types. When founded on **top of the residual soils**, foundation settlement in these areas is not expected to **exceed 5 mm**. However, moderate compaction of the base prior to the casting of the foundations is highly recommended.

- **Safe Bearing Capacity:** Based on the available geotechnical data, Bashan Geotechnics is of the opinion that, when founded within the medium dense soil materials at the recommended founding depth (of 0.80 m), a safe bearing capacity of **100 - 125 kPa** is feasible. However, a final decision regarding the technical specifications (in line with adopted founding solutions) shall be done so at the discretion of the Design Engineer.

6.2.2 Proposed Construction Methods

The founding recommendations contained in this Report relate to **single storey masonry construction** site where the proposed construction of the Polokwane International Softball Stadium will take place. The following recommended founding solutions serve as a guide (only) and may have to be reviewed prior to the commencement of the construction phase.

Bashan Geotechnics is of the view that normal to modified normal construction techniques should suffice as long as any collapsible and highly compressible soils (if observed on site are removed and/or spoilt) prior to the commencement of the construction stage.

Table 14 Polokwane International Softball Stadium Foundation Design Parameters			
Site Class	Estimated Total Heave / Total Collapse (mm)	Construction Type	Foundation Design and Building Procedure (Expected Damage Limited to Category-1)
H / S	< 7.5	Normal Construction	- Normal construction (strip footing or slab-on-the-ground) foundation. - Site drainage and service / plumbing precautions recommended.

6.3 Terraces and Parking Areas

Depending on the requirements for the abnormal loads in terms of transporting materials and equipment onto and from the site, the site roads should be graded. During the road construction process, the pavement design parameters should be based on the anticipated traffic volumes and the state of the ground conditions. In addition, design of all access roads and parking areas should take cognisance of the saturated CBR's existing materials on site.

Table 15 Polokwane International Softball Stadium Proposed Design Parameters for Terraces and Parking Areas	
Layer Works	Construction Techniques
Wearing Course	-25 mm medium asphalt wearing course
Base	-150 mm thick / Graded crushed stone compacted to 88% of apparent density -G1
Subbase	-150 mm thick stabilised natural gravel compacted to 95% of Modified AASHTO density -Minimum UCS + 1 200 kPa at 95% of Modified AASHTO density -C4
Upper selected subgrade	-150 mm thick natural gravel compacted to 93% of modified AASHTO density -Minimum CBR = 15 @ 90% of MOD AASHTO - G7 (in-situ or imported)
Lower selected subgrade	-150 mm thick natural gravel compacted to 90% of modified AASHTO -Subgrade density with minimum CBR = 7 @ 90% of modified AASHTO density -G9 (in-situ or imported)
Fill (where required)	-150 mm thick layers compacted to 90% of Modified AASHTO density -Minimum CBR = 3 % @ 90% of Modified AASHTO

- The recommended **engineered fill** (wherever required) should be **G7** (or a better quality) material in 150 mm thick layers and compacted to at least 93% of the maximum dry density at -1% to + 2% optimum moisture content (OMC).
- All transported soil materials on site show a high likelihood of being highly variable (in thickness and composition), and by composition, these materials can be potentially collapsible and therefore it is suggested that the upper 300 mm should be ripped, wetted to +2% of OMC and then compacted to 93% maximum dry density.
- The site soils would likely be considered adequate as subgrade materials after compaction. The design value for the modulus of subgrade reaction (k) for floor slab design would normally be between **35 - 65 kPa / mm** provided the subgrade beneath surface beds or floor slabs can be ripped to a depth of 300mm and re-compacted to 93% Mod AASHTO dry density.

6.4 Excavation Requirements and Trenchability

Bashan Geotechnics recommends that all ancillary construction activities on site should be conducted in accordance with SABS 1200D, COLTO 3000, TRH4, TRH14, the Red Book, other applicable standards and / or as directed by the project design engineer.

Based on the results of the current geotechnical survey, the soils at the project site are classified as “**soft to intermediate excavations**” from surface to depths in excess of 1.30 m below the natural ground level. The soft zone is the recommended founding layer and due to its relative density, settlement and / or collapse could occur.

Table 16 Polokwane International Softball Stadium Classification of Materials for Machine Excavations	
Excavation Classification	Description
RESTRICTED EXCAVATIONS	
Soft	Material which can be effectively removed by a back-acting excavator with flywheel power greater than 0.10 kW for each mm of tined-bucket width.
Intermediate	Material which can be removed by a back-acting excavator with flywheel power greater than 0.10 kW for each mm of tined-bucket width and/or with the use of pneumatic tools before the removal by a machine capable of removing soft material
Hard Rock	Material that cannot be removed without blasting or wedging and splitting
NON-RESTRICTED EXCAVATIONS	
Soft	Material which can be efficiently removed or loaded (without prior ripping) by any of the following plant: ▪ A bulldozer or track type front-end loader having an approximate mass of 22 tons and a flywheel power of 145 kW. ▪ A tractor-scraper unit having an approximate mass of 28 ton and a flywheel power of 245 kW, pushed during loading by a bull dozer equivalent to that described above.
Intermediate	Material that can be effectively ripped by a bulldozer having an approximate mass of 35 ton and a fly wheel power of 220 kW.
Hard Rock	Material that cannot be effectively ripped by a bulldozer having an approximate mass of 35 ton and a fly wheel power of 220 kW.
Boulder (Class A)	Material containing more than 40% (by volume) of boulders with sizes ranging between 0.03 m ³ and 20 m ³ , in a matrix of soft material or smaller boulders.
Boulder (Class B)	Material containing 40% or less (by volume) of boulders with sizes ranging between 0.03 m ³ and 20 m ³ , in a matrix of soft material or smaller boulders.

6.5 Pipe Bedding

It is highly unlikely that the in-situ soil materials occurring on site could meet the strict bedding specifications (as contained in the requirements of the SABS 1200LB and therefore this aspect should be allowed for in the tender documents).

It is strongly recommended that the subsoil drains (if required) be designed according to the specific filter criteria of the in situ soils to prevent piping of the material and subsequent rapid erosion. Bashan Geotechnics is of the view that provision should be made for cable ducts beneath all internal site roads and should be placed at a depth with a minimum cover of 750 mm. Cable ducts placed at shallower depths should be adequately encased in concrete.

6.6 Construction Materials

The soils from the residual soils may be used as long as the quantities (tonnages and volumes) can be guaranteed and that they fit into the general requirements of the design parameters to be finalised by the Design Engineer. Additional construction materials may have to be imported from a commercial source and / or borrow pit.

Under no circumstances should foundations be placed in, and / or, on untreated natural subsoils unless it has been specifically engineered to support structural foundations. In this regard, all fill and backfill are to be placed in association with the site development objectives and should be accomplished at a minimum of 5% points over optimum moisture conditions using equipment (such as a pad foot vibratory roller) that is capable of producing a uniformly compacted product.

- Engineered fill mattresses to be considered where conventional foundations shall be deemed unfeasible. Compaction of the residual soil material below the floor slab will involve the removal of the in-situ material to a nominal depth as per structural designs and replacing it with a well-graded **G5 – G6** material compacted to 95% MOD AASHTO at a density of 1 to +2% of optimum moisture content.
- In this case, engineered soil mattresses (comprising of **G7** material or better natural soils and gravels should be constructed in 150 mm thick pavement layers, with each layer compacted to at least 95% Mod AASHTO dry density. A minimum effective soil improved thickness of 0.50 - 1.0 m below the bottom of the strip and pad foundations (respectively), should then be adopted.
- The engineered fill width should then extend for a minimum of 0.50 m beyond structural footprints. Conventional, mildly reinforced, shallow foundations may then be constructed on top of the engineered soil mattresses.
- All fill and backfill to be placed in association with the site development objectives and should be accomplished at a minimum of 5% points over optimum moisture conditions using equipment that is capable of producing a uniformly compacted product.
- For fills between 0.0 – 0.50 m in height, the fill material should be placed in single layers not exceeding the 0.15 m loose thickness and should be compacted by an impact roller (to at least 93% maximum dry density at 2% wet of optimum moisture content).
- The backfill above the foundations should be compacted to the same density as the remainder of the terrace in order to avoid zones of high porosity and permeability around the foundations.

6.7 Construction Site Management

6.7.1 Site Preparation

Site clearance of all organic material on the footprint must be conducted prior to excavating and laying of the foundations. All existing subsurface utilities that are abandoned should either be fully grouted or removed and all the trenches backfilled and compacted. Cobbles and boulders larger than $\frac{2}{3}$ of the layer thickness and all clayey or organic material must not be included in the fill material.

All excavations extending below the groundwater level should be closely monitored by a Competent Person (for further evaluation). Excavations within approximately 5.00 m of the groundwater level may encounter basal pumping conditions during construction. In addition, all excess soils from the service trenches should not be spoiled on the general site area (otherwise the subgrade for the surface beds and possibly for footings will be adversely affected)

All existing subsurface utilities that may be left abandoned should either be fully grouted or removed and all the trenches backfilled and compacted. Nuclear densimeter (troxler) tests should be undertaken on a routine basis as the layers are placed and at the intervals prescribed in SABS 1200 D. It should be noted that the soils prevalent on site are moisture sensitive, and it will not be possible to achieve satisfactory compaction if the soils are wet or dry (as may be caused by natural, seasonal changes).

Stockpiles should be of limited height to avoid excessively anaerobic conditions and deterioration of potential seeds and rhizomes, which are necessary to encourage later re-vegetation. It is highly recommended that Bashan inspects and approves all foundation excavations to confirm the depth of founding and bearing capacity of the underlying founding horizons.

In order to stabilise the base of the excavation, deepening the earthworks coupled with the laying of crushed rock (or a combination of crushed rock and a geotextile) at the base of the excavation. The thickness of the crushed rock and geotextile required to stabilise the base of the excavation will vary depending on the local groundwater conditions. Appropriate site drainage and/or service plumbing precautions are highly recommended.

Care should be exercised during the construction phase by removing all loose and clayey soils below the foundations. In order to stabilise the base of the excavation, deepening of the earthworks (coupled with the laying of a crushed rock or a combination of crushed rock and a geotextile) at the base of the excavation is recommended. Oversized boulder material must be removed prior to the placement of the geotextile / engineered fill.

6.7.2 Earthworks

The responsibility for all future excavations at the proposed site remains with the engineering contractor who shall be in better position to assess the stability thereof during the construction. The sidewalls of the test pits were stable and showed no signs of instability during the field investigation process.

In general, it is recommended that cut slopes and fill embankments should have a maximum slope of 1 vertical to 2 horizontal to ensure stability. Excavation with unsupported side walls will remain relatively stable for short periods (less than 24 hours) unless they are destabilized by a storm or a perched groundwater seepage. The need for the subsoil drainage (both beneath and in fills) will have to be assessed during the earthworks, taking into account the height and locality of individual fills.

Although sidewall collapses are not expected given the nature of site material, excavation sidewalls should however be designed to counter for potential collapse into the workings (as a safety measure). It should be noted that grading of the site might include the construction of new slopes. In all areas where new fill slopes are proposed, we recommend that the existing topsoil or the upper 0.50 m of supporting soil (or whichever is deeper) be excavated to form native soil.

Any slopes greater than 1.5 m in height may have to be analysed in terms of their global stability (and strength) and this may have to be discussed with the Resident Engineer prior to any construction taking place. Dewatering mechanism may be required should the earthwork construction commence within the summer rainy season.

Sidewall seepage will necessitate battering of open trenches to nominal angles of **1.5H : 1V** (H for horizontal and V for vertical) in order to promote their long-term stability aimed at reducing possible block sliding caused by the groundwater uplift pressure. If the above is not possible, then shear strength tests should be carried out to verify the appropriate shear strength. Slope faces should be compacted to the recommended degree of compaction.

Backfill to service trenches must be raised slightly above the surrounding ground level and be properly compacted to avoid the formation of a surface depression as a result of settlement of the backfill. Such depressions will increase the ingress of stormwater runoff into the soils. It is recommended that the number of trenches running at right angles to contours be limited as these often become preferential drainage paths. All service trenches deeper than 1.5 m must be shored.

6.8 Stormwater Management

One of the most important factors in the promotion of a stable site is the control and removal of both surface and groundwater from the property. Since the area to be developed is in excess of 0.80 hectares, the storm water received onto and generated on the site will have to be managed and attenuated on site.

The most important factor in the promotion of a stable site is adequate drainage (both surface and subsurface), be constructed so that no water ingress into the subsurface soils in and around the foundation base is possible. The natural ingress of groundwater and the additional localised inundation due to the development itself should be managed and controlled to prevent erosion and the collapse settlement of materials. All drainage installations should be completed prior to the start of the building construction.

In addition, run-off from roofs should be piped from gutters through downpipes and similarly discharged into the storm water system. Care must be taken not to affect area downslope of the development as volumes of run-off can be significant and lead to damage and erosion to adjacent properties.

Surface drainage of building platforms should be designed to direct water away from fill edges, to prevent overtopping of the fill crest and erosion of fill embankment slopes. Surface water on these platforms should be directed to, and collected in, open lined drains or piped to the natural drainage line.

Both during and after construction, the platforms should be well graded to permit water to readily drain from the site and to prevent the ponding of water anywhere on the surface. All terraces and earthworks (in general) should be graded to prevent ponding and ingress of water into the subsurface soils.

All terraces and earthworks in general should be sloped to a gradient of not less than 1 vertical in 50 horizontal to prevent ingress of water into the subsoils since these soils might be significantly permeable. Surface drainage should be directed away from the crests of fill embankments to prevent over-topping and erosion of fill slopes.

Aspects such as the placement of the block paving and/or concrete slabs adjacent to the wet services, the location of irrigation systems and drainage of water from air conditioning units need to be carefully considered. It is important that grassing or protection of fill embankments be carried out as soon as possible after construction, to minimise ponding of the water on the cut platforms to reduce slope instability and piping erosion.

6.9 Reactive Soils

Corrosion of metallic fittings and other construction materials is likely to be negatively impacted by low pH and high conductivity (indicating a high concentration of dissolved salts in the soils). It should be pointed out that soluble sulphate in the irrigation water supply and/or the use of fertiliser may cause the sulphate content in the surficial soils to increase significantly with time. This may result in a higher sulphate exposure than that indicated by the test results reported here-in.

Research has proven that the use of improved cements in the concrete, coupled with a low water-cement ratio will drastically improve the resistance of the concrete to sulphate exposure. The burial of any form of corrosive metal piping and/or tanks will require some form of galvanising, bitumen and/or epoxy coating. Standard HDPE or uPVC pipe products will be suitable and all buried metallic valves and fittings should be powder-coated as a standard precaution.

All the reinforcing material must be totally submerged in concrete so as to limit the moisture exposure that might cause steel corrosion leading to concrete spalling. In addition, the use of plastic (or PVC) pipes is highly recommended. Adequate rebar cover in buried concrete foundations is highly recommended to mitigate against rust. Bashan is of the opinion that a corrosion consultant should be contacted to provide corrosion control recommendations.

6.10 Special Precautionary Measures and Construction Monitoring

Bashan Geotechnics recommends that a **Competent Person** should inspect the diggings of all foundations (and other associated or ancillary construction activities on site). In general, good practice requires that the in-situ moisture content of the founding horizons below the structure should be adequately maintained, and in this regard, the following precautions should be adhered to:

- Special inspections shall include a mandatory monitoring of the civil works prior to placing any concrete on site conducting and conducting regular checks on the quality and compaction of the backfill to the terraces.
- Should the foundations of the structures be positioned on or over the test pit position, the backfilled material must be properly compacted to prevent excessive differential settlement.
- The ground should be shaped so that no ponding occurs against the building structures. As a good practice, no water should be allowed to pond against or within the first meter from the external perimeter of the structure.
- Note that compaction control is a prerequisite and all foundations should not span across residual soils and un-compacted fill (or the transported soils), since fill that is not adequately compacted, can translate into significant differential settlement even with light loads and minimal total settlement of less 10 mm. Where this is unavoidable, the Design Engineer's final design parameters should accommodate both the potential total as well as the differential settlement.
- Gardens located against the external perimeter of the structure are not recommended. Leaks (in plumbing and associated drainage) should be attended to immediately. In addition, no large shrubs and/or trees are to be planted closer than 0.75 x the mature height of the tree.
- Subsurface services should be designed and constructed so that they are located sufficiently far (at least 1.50 m) away from the structures and all the backfilled trenches should not interfere with the foundations for the main building infrastructure and other structures.
- Septic tanks and French drains should be situated well away down gradient from any buildings.

7 CONCLUSIONS AND DISCUSSIONS

7.1 Conclusions

This Phase 1 – Geotechnical Report presents the findings of a site geotechnical investigation survey carried out at the proposed construction site of a new sports complex (with associated parking areas) and dubbed the Polokwane International Softball Stadium. The proposed construction site is located near Polokwane Extension 24 (just north of the Peter Mokaba Soccer and Rugby Stadium).

- **Site Geology:** The site geology is potentially underlain (at depth) by rocks assigned to the Mothiba Formation (Zpm) of the Pietersburg Group (Zp), the Hout River Gneiss (Rhr), the Turfloop Granite (Vt) and some overlying Quaternary Deposits (Q). Rocks assigned to the Mothiba Formation (Zpm) include various ultramafic metavolcanics including talc rich, talc-chlorite and amphibole-chlorite schists and serpentinite.
- **Soil Stratigraphy:** Based on test pit excavations, soil profiling and detailed interpretation of the DCP sounding surveys, Bashan Geotechnics has delineated a minimum of four (04) soil horizons on site, namely; topsoil (0.00 – 0.50 m); Colluvium (0.20 – 1.00 m), Reworked Residual (0.30 – 1.10 m) and, Residual soils (0.20 – 1.30 m).
- **NHBRC Site Zone:** Based on the available geotechnical data, Bashan Geotechnics is of the opinion that, the recommended NHBRC Site Class is **H - S - C** (across the entire site).
- **Proposed Founding Depth:** It is our opinion that the top of the Residual soil layer should be considered as a suitable founding medium for the proposed structure. Based on the findings of the current geotechnical investigations for a simple (single-storey) building, a founding depth at the project site should be **0.80 m** (below the existing ground surface).
- **Estimated Bearing Capacity:** When founded within the medium dense to dense soil materials at the recommended founding depth, a safe bearing capacity of 100 kPa is feasible.
- **Proposed Construction Methods:** Bashan Geotechnics is of the view that normal construction techniques should suffice as long as any collapsible and highly compressible soils (if observed during the construction stage) are removed and/or spoilt prior to the commencement of the construction stage.
- **Compaction:** Note that compaction control is a prerequisite and all foundations should not span across residual soils and un-compacted fill (or the transported soils), since fill that is not adequately compacted, can translate into significant differential settlement even with light loads and minimal total settlement of less 10 mm.
- **Construction Materials:** The site soils would likely be considered adequate as subgrade materials (is subjected to compaction).

- **Soil Corrosivity:** The laboratory results conducted on the soil materials indicate that the soil's pH condition is generally defined as being slightly acidic to slightly and moderately alkaline. In addition, the soil's conductivity values indicates that the soil materials found on site are characterised as being **moderately** to being **highly corrosive** (towards metal, concrete and fibre).

7.2 Discussions

Bashan Geotechnics wishes to elaborate further that this investigation was thorough (at the required level and in line with the Client's objectives). Whilst every effort has been made during the fieldwork phase of this investigation to identify the various soil horizons (including the associated potential problems and their likely distribution), it is highly impossible to guarantee that isolated zones of poor material could have been missed. In addition, it should be pointed out that the ground conditions described in this Report refer specifically to those conditions encountered in the test pit excavated at the site. It is highly likely that certain conditions that may be at variance with those discussed above can be encountered at the site in the future.

- Where-as, it is considered that the conditions prevailing on site are such that the majority of the site is considered suitable for the proposed development (provided the recommendations outlined in this final Geotechnical Report are adhered to), Bashan Geotechnics has established that the main geotechnical constraints to the development will be collapsible subsoils.
- In view of the inherent variability of the natural materials, a Competent Person (such as the Engineering Geologist or Geotechnical Engineer) from Roadlab should inspect all foundation excavations at the time of the construction phase in order to ensure that the materials are adequate for the proposed structures and that they are in accordance with the recommendations stated in this report.
- Bashan Geotechnics has established that that all the necessary precautions should be adopted for all concrete to be placed within any of the soils (in accordance with SANS 1200G: Concrete) as a precautionary measure. In addition, all subsurface services (non-concrete) should preferably be treated or sleeved in order to prevent possible damage that may be caused by corrosion.
- It should be mentioned that it is never cost effective to construct foundations which totally remove the chance of damage due to foundations based on soil movements and in this light, some **Category - 1** damage to the structures may be expected (such as fine internal cracks of widths less than 1 mm aperture). To a much lesser extent some **Category - 2** damage may occasionally occur, leading to the formation of cracks of less than 5 mm aperture.
- Bashan Geotechnics is of the pinion that Roadlab should be called upon to inspect and approve all foundation excavations in order to confirm the founding depths and/or the bearing capacity of the underlying founding horizons.

RECOMMENDED BIBLIOGRAPHY

- Brink, A.B.A. and Bruin R.M.H. (editors) (2002). Guidelines for Soil and Rock Logging in South Africa, 2nd Impression, Procedures in Geoterminology Workshop, SAIEG - AEG - SAICE.
- South African Institution of Civil Engineering-Geotechnical Division (2010). Site Investigation Code of Practice, 1st Edition.
- Jennings J.E., Brink A.B.A. and Williams A.A.B. (1973); Revised Guide to Soil Profiling for Civil Engineering Purposes in Southern Africa; The Civil Engineer in South Africa, January 1973, pp 3-12
- Jennings J.E. and K. Knight (1975); A guide to construction on or with material exhibiting additional settlement due to collapse of grain structure; Journal of soil mechanics and foundation engineering; 6th Regional Conference for Africa on soil mechanics and foundation engineering; Durban, South Africa.
- Johnson, M.R., Anhaeusser, C.R. (Editors) (2006). The Geology of South Africa, Geological Society of South Africa, Council for Geosciences, Pretoria, pp 691.
- Van der Merwe, D.H; (1964); The Prediction of Heave from the Plasticity Index and Percentage Clay Fractions of Soils; The Civil Engineer in South Africa; June 1964
- Vermeulen, N; Wardle, G; Berry, A; Parrock, A; Vorster, E; Davis, G; Heymann, G; Grabe, H; Stiff, J; Day, P; Modishane, T; Pape, T; (2010); Site Investigations Code of Practice; The South African Institute of Civil Engineering; pp57
- Weinert, H. C (1980). The Natural Road Construction Materials of Southern Africa; H&R Academica; South Africa; pp231-238

Appendix A

Test Pit Soil Profiles and Laboratory Test Results

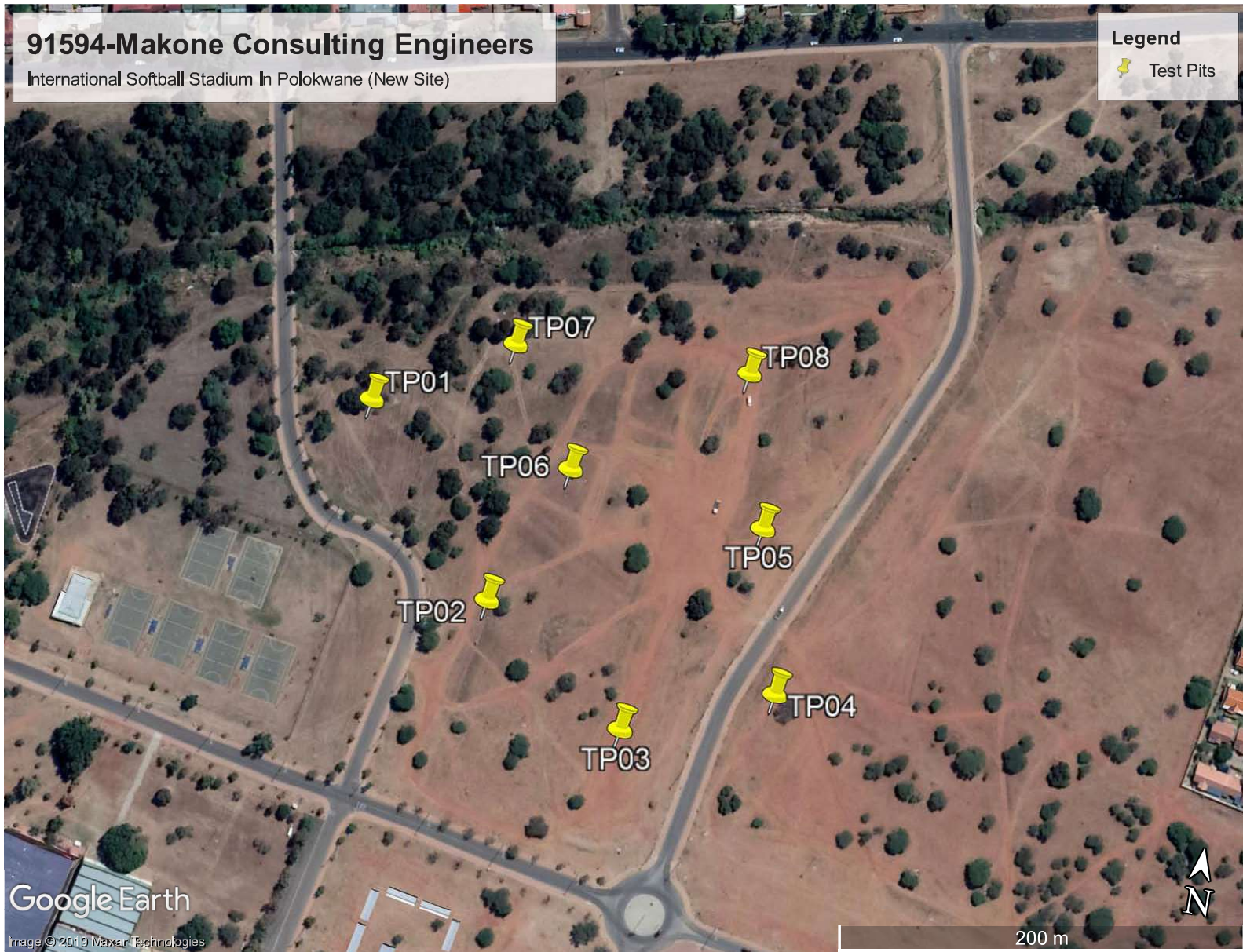


91594-Makone Consulting Engineers

International Softball Stadium In Polokwane (New Site)

Legend

 Test Pits



Client: Makone Consulting Engineers

TP No. 01

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,30	Dry, light Red Brown, Medium Dense, Intact, Silty Sandy Gravel , Transported.
			0,70	Dry, Brown, Loose to Medium Dense, Silty Sandy Gravel , Reworked Residual.
			1,10	Dry, White, Medium Dense to Dense, Silty Gravelly Sand , Residual. PI:17 GM:1.69 CBR@95%:12 Colto Classification:G9

Note 1: RI = Road Indicator
Note 3: FC = Full Classification

Note 2: FI = Foundation Indicator
Note 4: TLB Refused

Profiled By: Rabelanie
Excavation method: TLB

Coordinates: S23°55,11'10
: E29°27,58'74

91594

2019/09/02

Makone Consulting Engineers

P.O Box

Address

Area

Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.

The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES				
SAMPLE No.	2019/S4239			
CONTAINER USED FOR SAMPLING	Clients Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP01			
LAYER TESTED / SAMPLED FROM	700-1100mm			
DATE SAMPLED	2019/08/24			
DATE RECEIVED	2019/08/24			
CLIENTS MARKING	None			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Light Brown Silty Gravelly Sand			
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)				
SIEVE	75.0	100		
	63.0	96		
	50.0	93		
	37.5	89		
ANA -	28.0	83		
	20.0	81		
	14.0	79		
	5.00	64		
LYSIS (mm)	2.00	59		
	0.425	47		
	0.075	25		
SANS 3001 - PR5				
Soil Mortar		59		
Coarse Sand		20		
Fine Sand		37		
Coarse Fine Sand		15		
Medium Fine Sand		12		
Fine Fine Sand		10		
Silt & Clay		42		
Coarse Sand Ratio		0.2		
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)				
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	51.0		
	P.I.	17.0		
	LS%	8.6		
GM		1.69		
CLASSIFI - CATION	H.R.B.*	A-7-5(0)		
	COLTO*	G9		
	T.R.H. 14*	G9		
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)				
MOD AASHTO (SANS GR30)	OMC%	12.3		
	MDD(KG/M³)	1904		
	COMP MC %	12.1		
C.B.R. (SANS GR40)	% SWELL	0.34		
	100%	38		
	98%	28		
	97%	22		
U.C.S. (SANS GR53)	95%	12		
	93%	9		
	90%	5		
MOD ITS : DRY (kPa) (GR54)		N/A		
ITS @ 95% : DRY (kPa)		N/A		
STABILISED WITH	IN LAB	-		
	ON SITE	Neat		
TEST TYPE		CBR		
SAMPLED BY		Roadlab - Rabelani		
DELIVERED BY		Roadlab - Rabelani		
SAMPLING METHOD		TMH5 - MA2		
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot		
REMARKS & NOTES		None		

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation

SANAS Accredited Laboratory No. T 0296

The samples were subjected to analysis according to SANS 3001

The results reported relate only to the sample tested

Further use of the above information is not the responsibility or liability of Roadlab

Documents may only be reproduced or published in their full context

Compiled By : Chanel van Biljon

Mr. N Herbst

TECHNICAL SIGNATORY

Mr. D Juckers

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

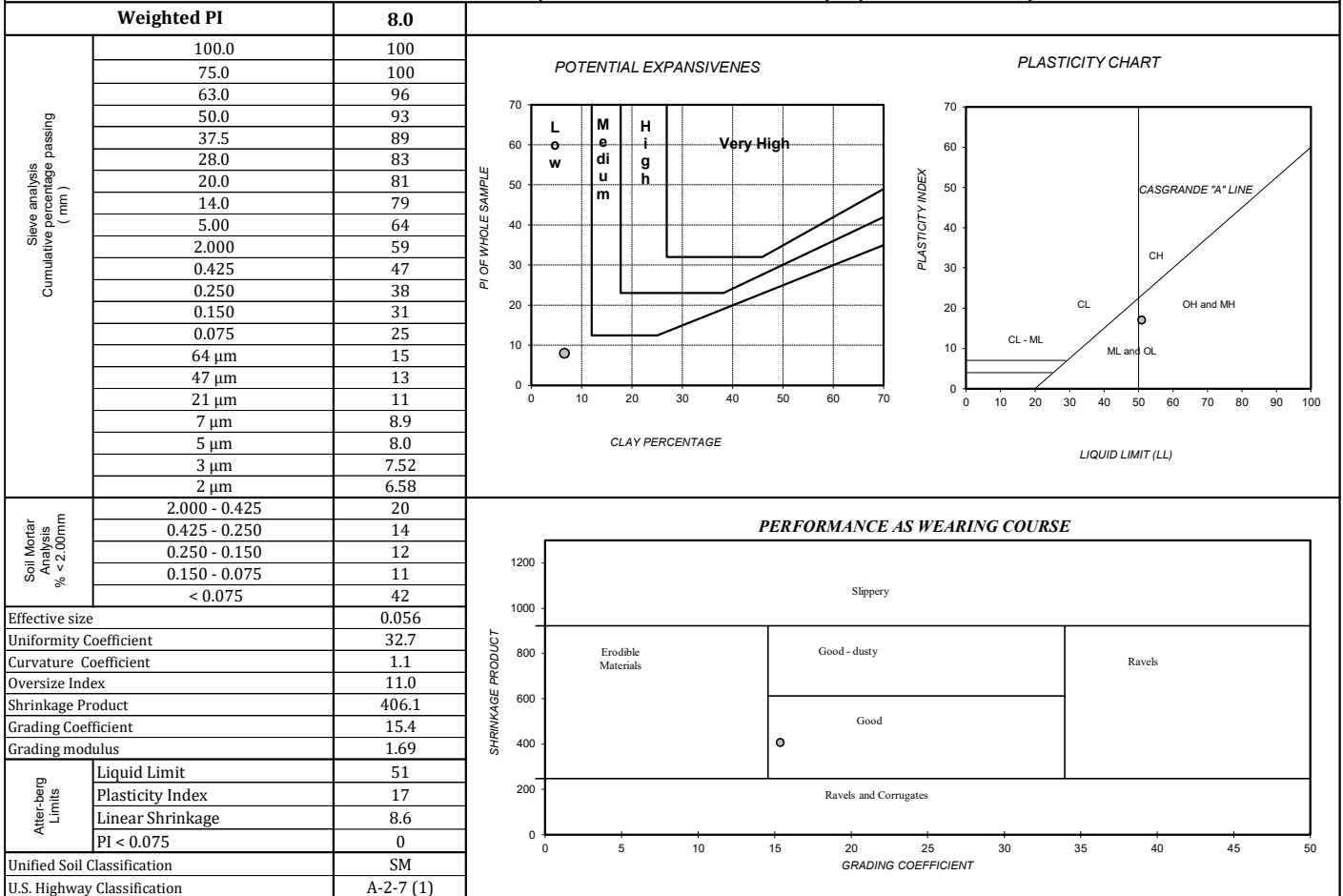
POSITION : TP01

LAYER : 700-1100mm

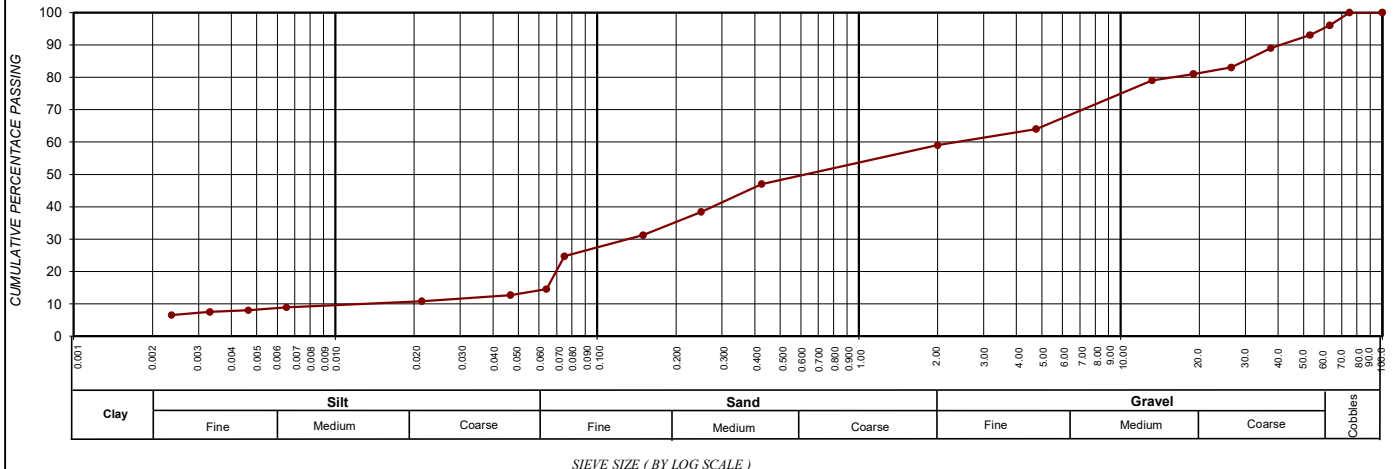
SAMPLE No. : S/4239

SAMPLE DESCRIPTION : Light Brown, Calcrete & Quartzitic Sand
Silty Gravelly Sand

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)



PARTICLE SIZE DISTRIBUTION



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
6.6	10.2	42.3	41.0

Client: Makone Consulting Engineers

TP No. 02

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,50	Dry, Dark Red Brown, Medium Dense, Intact, Silty Sandy Gravel , Transported.
			1,00	Dry, Light Red Orange, Medium Dense, Intact, Sandy Gravel with Cobbles (120mm) and Boulders (250mm) Reworked Residual. PI:12 GM:2.15 CBR@95%:10 Colto Classification:G9
			1,30	Dry, Light Orange Brown, Medium Dense to Dense, Intact, Gravelly Silty Sand , Residual.

Note 1: RI = Road Indicator

Note 2: FI = Foundation Indicator

Profiled By: Rabelanie

Coordinates: S23°55,14'05

Note 3: FC = Full Classification

Note 4: TLB Refused

Excavation method: TLB

: E29°28,1'43

91594

2019/09/02

Makone Consulting Engineers

P.O Box

Address

Area

Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.

The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES				
SAMPLE No.	2019/S4240			
CONTAINER USED FOR SAMPLING	Clients Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP02			
LAYER TESTED / SAMPLED FROM	500-1000mm			
DATE SAMPLED	2019/08/24			
DATE RECEIVED	2019/08/24			
CLIENTS MARKING	None			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Dark Brown Sandy Gravel			
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)				
SIEVE	75.0	100		
	63.0	95		
ANA -	50.0	95		
	37.5	92		
LYSIS (mm)	28.0	88		
	20.0	85		
(SANS GR1:2010)	14.0	80		
	5.00	46		
	2.00	40		
	0.425	31		
	0.075	14		
SANS 3001 - PR5				
Soil Mortar	40			
Coarse Sand	23			
Fine Sand	43			
Coarse Fine Sand	13			
Medium Fine Sand	18			
Fine Fine Sand	13			
Silt & Clay	35			
Coarse Sand Ratio	0.2			
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)				
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	29.0		
	P.I.	12.0		
	LS%	5.5		
GM		2.15		
CLASSIFI - CATION	H.R.B.*	A-2-6(0)		
	COLTO*	G9		
	T.R.H. 14*	G9		
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)				
MOD AASHTO (SANS GR30)	OMC%	6.4		
	MDD(KG/M³)	2109		
	COMP MC %	6.2		
	% SWELL	0.23		
C.B.R. (SANS GR40)	100%	13		
	98%	12		
	97%	11		
U.C.S. (SANS GR53)	95%	10		
	93%	9		
MPA	90%	8		
MOD ITS : DRY (kPa) (GR54)		N/A		
ITS @ 95% : DRY (kPa)		N/A		
STABILISED WITH	IN LAB	-		
	ON SITE	Neat		
TEST TYPE		CBR		
SAMPLED BY		Roadlab - Rabelani		
DELIVERED BY		Roadlab - Rabelani		
SAMPLING METHOD		TMH5 - MA2		
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot		
REMARKS & NOTES		None		

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation

SANAS Accredited Laboratory No. T 0296

The samples were subjected to analysis according to SANS 3001

The results reported relate only to the sample tested

Further use of the above information is not the responsibility or liability of Roadlab

Documents may only be reproduced or published in their full context

Compiled By : Chanel van Biljon

Mr. N Herbst

Mr. D Juckers

TECHNICAL SIGNATORY

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

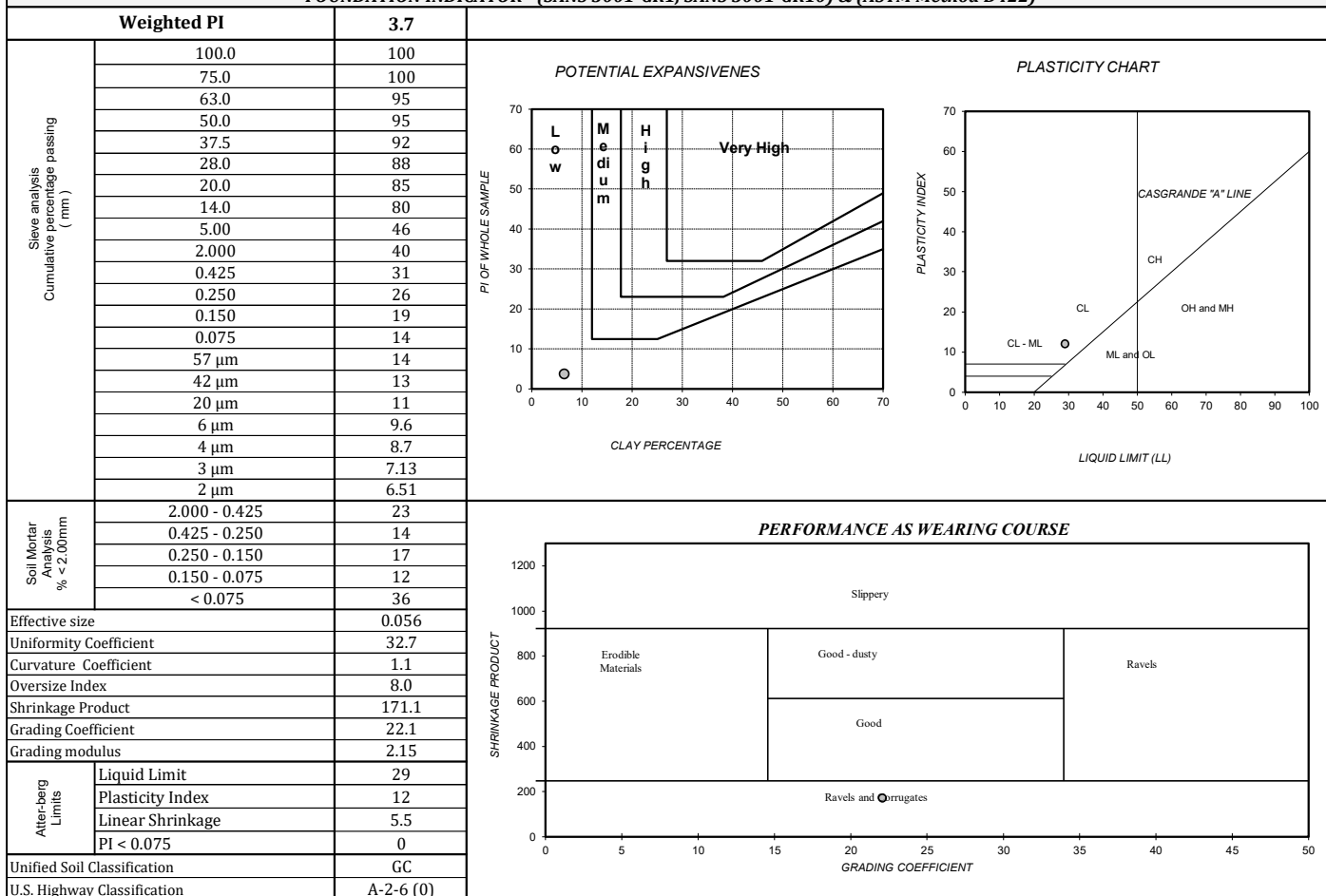
POSITION : TP02

LAYER : 500-1000mm

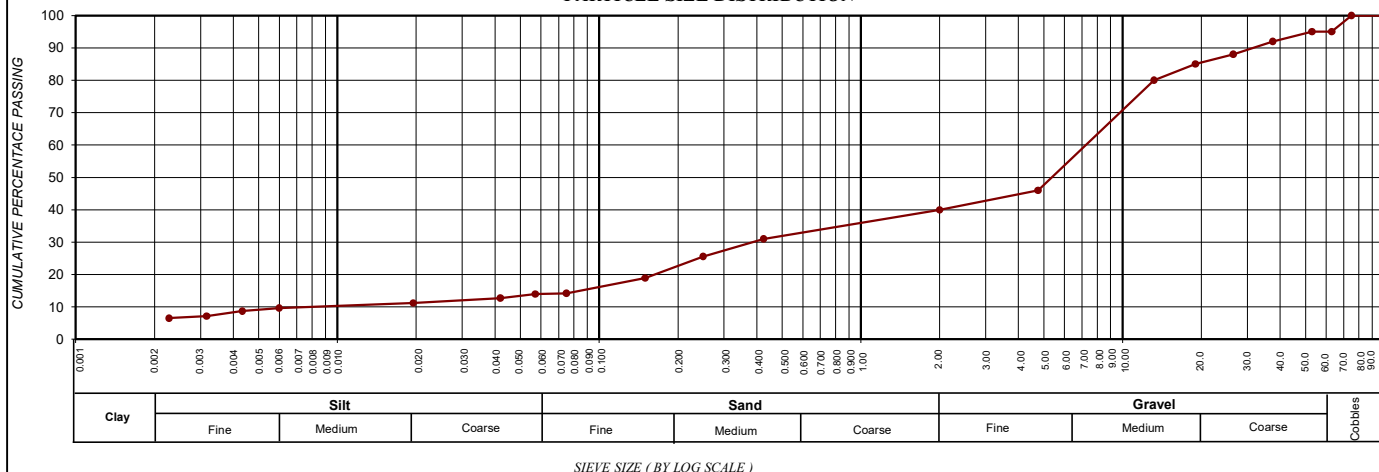
SAMPLE No. : S/4240

SAMPLE DESCRIPTION : Dark Brown, Quartz & Ferricrete
Sandy Gravel

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)



PARTICLE SIZE DISTRIBUTION



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
6.5	7.2	26.3	60.0

Client: Makone Consulting Engineers

TP No. 03

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,25	Dry, Dark Red Brown, Medium Dense, Intact, Silty Sandy Gravel , Transported.
			0,45	Dry, Dark Red Brown, Loose to Medium Dense, Intact, Silty Gravelly Sand , Transported.
			1,20	Dry, Light Olive Mottled Orange Black, Medium Dense to Dense, Intact, Silty Sandy Gravel with Cobbles (74mm) Residual. PI:12 GM:2.10 CBR@95%:7 Colto Classification:G9

Note 1: RI = Road Indicator
Note 3: FC = Full Classification

Note 2: FI = Foundation Indicator
Note 4: TLB Refused

Profiled By: Rabelanie
Excavation method: TLB

Coordinates: S23°55,15'75
: E29°28,4'15

91594

2019/09/02

Makone Consulting Engineers

P.O Box

Address

Area

Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.

The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES				
SAMPLE No.	2019/S4241			
CONTAINER USED FOR SAMPLING	Clients Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP03			
LAYER TESTED / SAMPLED FROM	450-1200mm			
DATE SAMPLED	2019/08/24			
DATE RECEIVED	2019/08/24			
CLIENTS MARKING	None			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Dark Brown Silty Sandy Gravel			
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)				
SIEVE	75.0	100		
	63.0	100		
	50.0	99		
	37.5	96		
ANA -	28.0	93		
	20.0	89		
	14.0	87		
	5.00	59		
LYSIS (mm)	2.00	48		
	0.425	29		
	0.075	13		
SANS 3001 - PR5				
Soil Mortar		48		
Coarse Sand		39		
Fine Sand		33		
Coarse Fine Sand		15		
Medium Fine Sand		8		
Fine Fine Sand		10		
Silt & Clay		27		
Coarse Sand Ratio		0.3		
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)				
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	29.0		
	P.I.	12.0		
	LS%	5.6		
GM		2.10		
CLASSIFI - CATION	H.R.B.*	A-2-6(0)		
	COLTO*	G9		
	T.R.H. 14*	G9		
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)				
MOD AASHTO (SANS GR30)	OMC%	9.2		
	MDD(KG/M³)	2168		
	COMP MC %	9.0		
C.B.R. (SANS GR40)	% SWELL	0.26		
	100%	18		
	98%	14		
	97%	11		
U.C.S. (SANS GR53)	95%	7		
	93%	6		
	90%	5		
MOD ITS : DRY (kPa) (GR54)		N/A		
ITS @ 95% : DRY (kPa)		N/A		
STABILISED WITH	IN LAB	-		
	ON SITE	Neat		
TEST TYPE		CBR		
SAMPLED BY		Roadlab - Rabelani		
DELIVERED BY		Roadlab - Rabelani		
SAMPLING METHOD		TMH5 - MA2		
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot		
REMARKS & NOTES		None		

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation

SANAS Accredited Laboratory No. T 0296

The samples were subjected to analysis according to SANS 3001

The results reported relate only to the sample tested

Further use of the above information is not the responsibility or liability of Roadlab

Documents may only be reproduced or published in their full context

Compiled By : Chanel van Biljon

Mr. N Herbst

Mr. D Juckers

TECHNICAL SIGNATORY

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

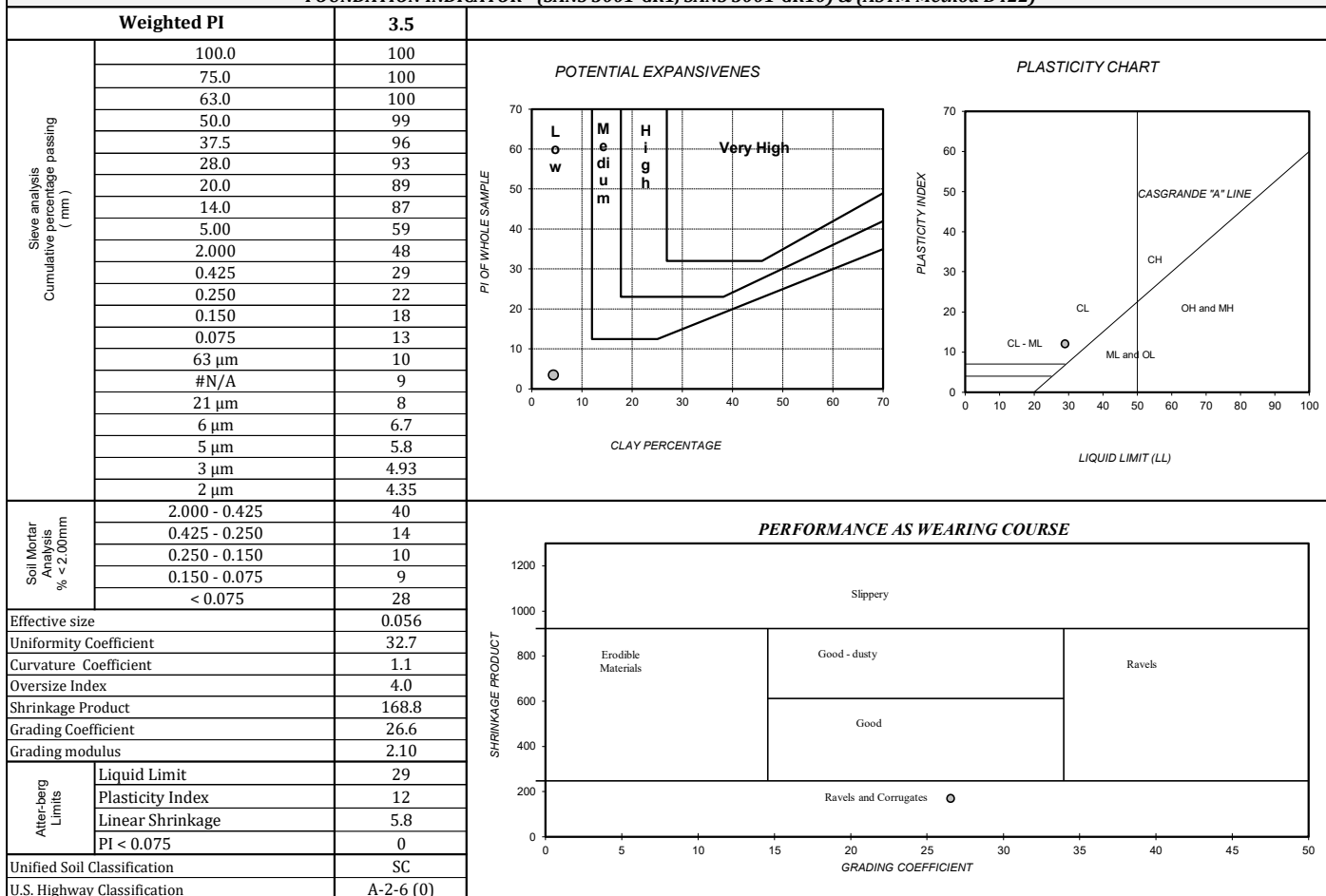
POSITION : TP03

LAYER : 450-1200mm

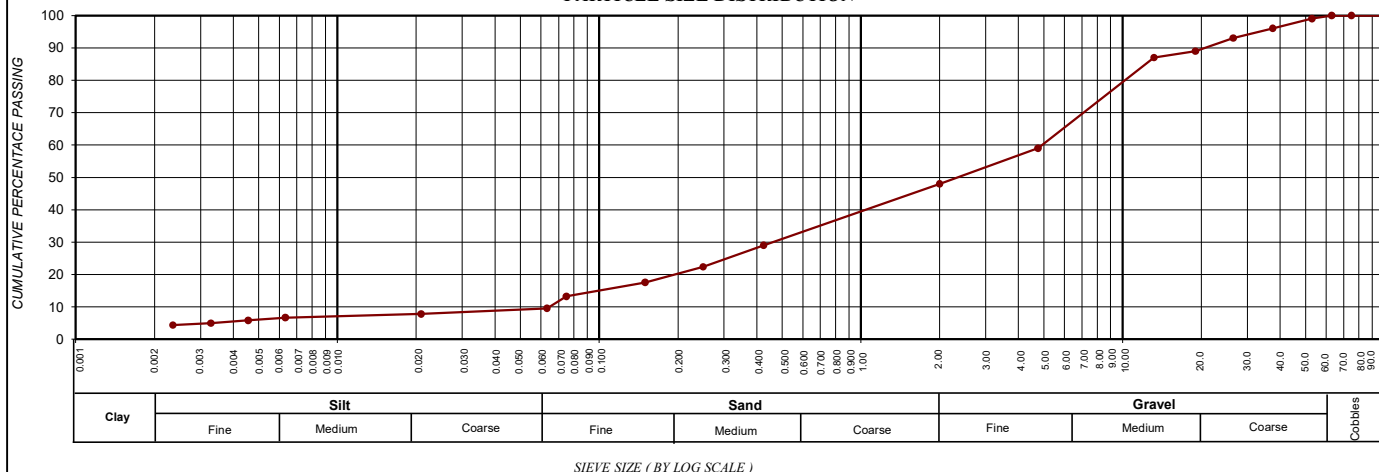
SAMPLE No. : S/4241

SAMPLE DESCRIPTION : Dark Brown, Quartz & Ferricrete
#VALUE!

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)



PARTICLE SIZE DISTRIBUTION



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
4.4	#VALUE!	#VALUE!	52.0

Client: Makone Consulting Engineers

TP No. 04

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,20	Dry, Dark Red Brown, Medium Dense, Intact, Silty Sandy Gravel , Transported.
			1,00	Slightly Moist, Light Olive Orange, Medium Dense to Dense, Intact, Sandy Gravel with Cobbles (150mm) Residual. Pl:13 GM:2.21 CBR@95%:2 Colto Classification:<G9

Note 1: RI = Road Indicator
Note 3: FC = Full Classification

Note 2: FI = Foundation Indicator
Note 4: TLB Refused

Profiled By: Rabelanie
Excavation method: TLB

Coordinates: S23°55,14'78
: E29°28,6'75

91594

2019/09/02

Makone Consulting Engineers

P.O Box

Address

Area

Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.

The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES				
SAMPLE No.		2019/S4242		
CONTAINER USED FOR SAMPLING		Clients Bags		
SIZE / WEIGHT OF SAMPLE		±70kg's		
MOISTURE CONDITION OF SAMPLE ON ARRIVAL		Slightly Moist		
HOLE No. / Km. / CHAINAGE		TP04		
LAYER TESTED / SAMPLED FROM		200-1000mm		
DATE SAMPLED		2019/08/24		
DATE RECEIVED		2019/08/24		
CLIENTS MARKING		None		
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Light Brown Sandy Gravel		
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)				
SIEVE	75.0	100		
	63.0	95		
	50.0	94		
ANA -	37.5	91		
	28.0	86		
	20.0	83		
LYSIS (mm)	14.0	79		
	5.00	46		
	2.00	38		
(SANS GR1:2010)	0.425	28		
	0.075	13		
SANS 3001 - PR5				
Soil Mortar		38		
Coarse Sand		26		
Fine Sand		39		
Coarse Fine Sand		16		
Medium Fine Sand		11		
Fine Fine Sand		13		
Silt & Clay		34		
Coarse Sand Ratio		0.2		
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)				
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	33.0		
	P.I.	13.0		
	LS%	6.3		
GM		2.21		
CLASSIFI - CATION	H.R.B.*	A-2-6(0)		
	COLTO*	<G9		
	T.R.H. 14*	G10		
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)				
MOD AASHTO (SANS GR30)	OMC%	8.2		
	MDD(KG/M³)	2093		
	COMP MC %	8.0		
	% SWELL	0.27		
C.B.R. (SANS GR40)	100%	5		
	98%	4		
	97%	3		
	95%	2		
U.C.S. (SANS GR53)	93%	2		
	90%	1		
	MOD ITS : DRY (kPa) (GR54)		N/A	
ITS @ 95% : DRY (kPa)		N/A		
STABILISED WITH	IN LAB	-		
	ON SITE	Neat		
TEST TYPE		CBR		
SAMPLED BY		Roadlab - Rabelani		
DELIVERED BY		Roadlab - Rabelani		
SAMPLING METHOD		TMH5 - MA2		
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot		
REMARKS & NOTES		None		

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation

SANAS Accredited Laboratory No. T 0296

The samples were subjected to analysis according to SANS 3001

The results reported relate only to the sample tested

Further use of the above information is not the responsibility or liability of Roadlab

Documents may only be reproduced or published in their full context

Compiled By : Chanel van Biljon

Mr. N Herbst

TECHNICAL SIGNATORY

Mr. D Juckers

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

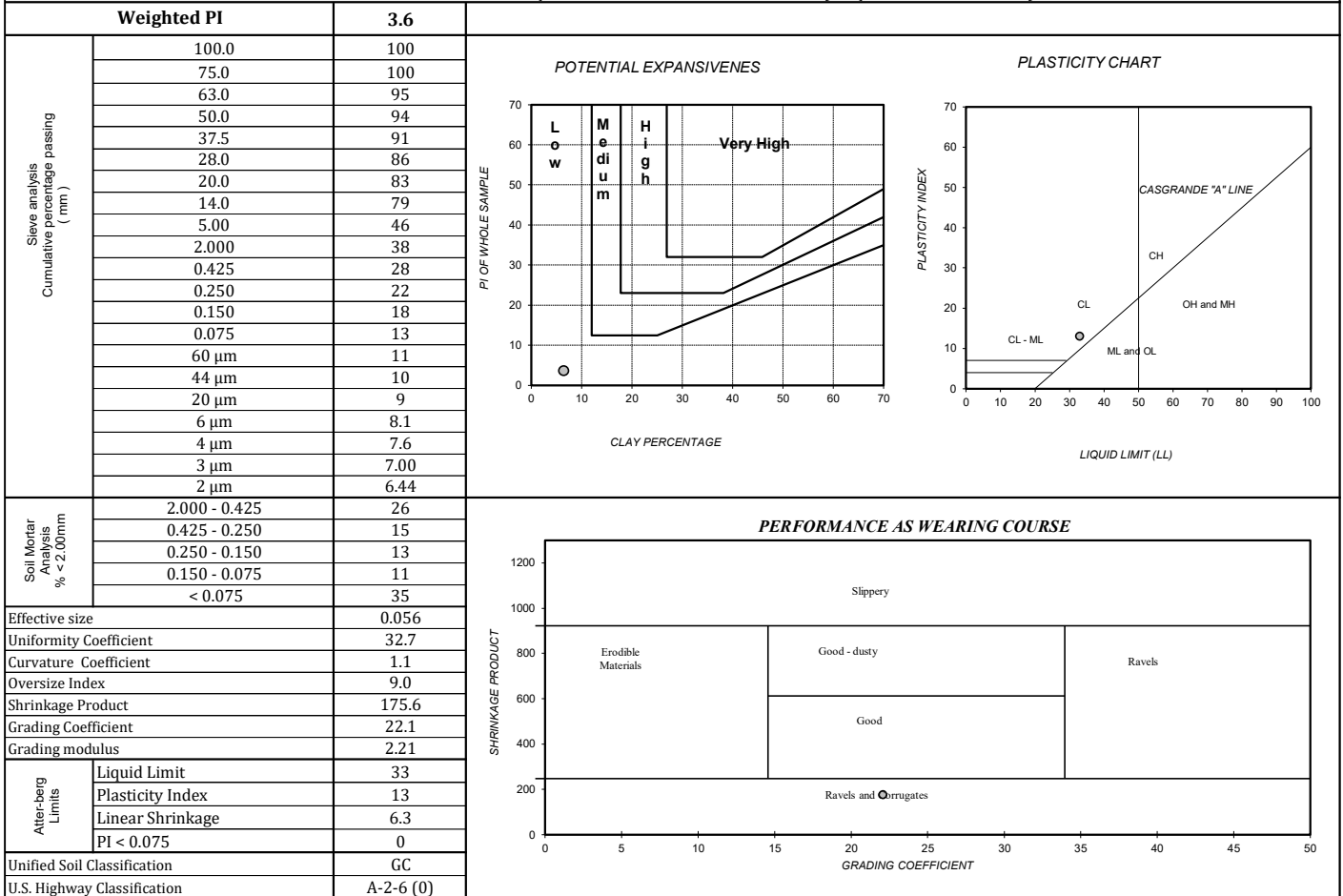
POSITION : TP04

LAYER : 200-1000mm

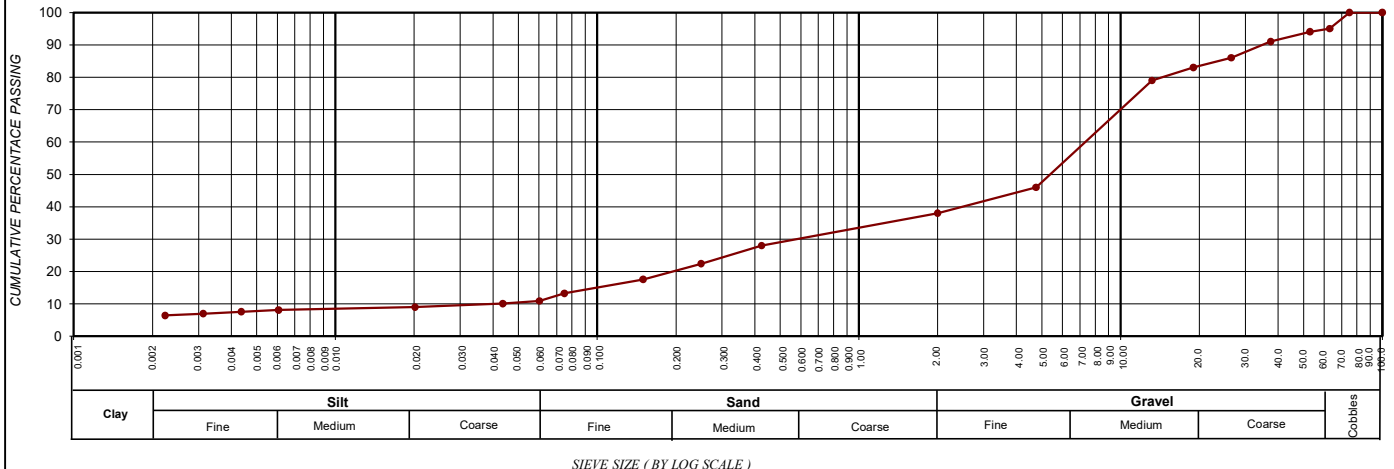
SAMPLE No. : S/4242

SAMPLE DESCRIPTION : Light Brown, Ferricrete & Quartz
Sandy Gravel

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)



PARTICLE SIZE DISTRIBUTION



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
6.4	4.9	26.7	62.0

Client: Makone Consulting Engineers

TP No. 05

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,30	Dry, Brown, Medium Dense, Intact, Silty Gravelly Sand , Transported.
			0,80	Dry, Dark Red Orange, Medium Dense, Intact, Silty Sandy Gravel , Transported.
			1,20	Dry, Light Olive Orange, Medium Dense to Dense, Intact, Sandy Gravel , Residual. PI:12 GM:2.19 CBR@95%:7 Colto Classification:<G9

Note 1: RI = Road Indicator
Note 3: FC = Full Classification

Note 2: FI = Foundation Indicator
Note 4: TLB Refused

Profiled By: Rabelanie
Excavation method: TLB

Coordinates: S23°55,12'15
: E29°28,6'08

91594

2019/09/02

Makone Consulting Engineers
 P.O Box
 Address
 Area
 Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
 The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES				
SAMPLE No.		2019/S4243		
CONTAINER USED FOR SAMPLING		Clients Bags		
SIZE / WEIGHT OF SAMPLE		±70kg's		
MOISTURE CONDITION OF SAMPLE ON ARRIVAL		Slightly Moist		
HOLE No. / Km. / CHAINAGE		TP05		
LAYER TESTED / SAMPLED FROM		800-1200mm		
DATE SAMPLED		2019/08/24		
DATE RECEIVED		2019/08/24		
CLIENTS MARKING		None		
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Light Red Orange Sandy Gravel		
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)				
SIEVE	75.0	100		
	63.0	100		
ANA -	50.0	97		
	37.5	95		
	28.0	89		
	20.0	84		
	14.0	79		
LYSIS (mm) (SANS GR1:2010)	5.00	51		
	2.00	39		
	0.425	27		
	0.075	15		
SANS 3001 - PR5				
Soil Mortar		39		
Coarse Sand		31		
Fine Sand		31		
Coarse Fine Sand		13		
Medium Fine Sand		10		
Fine Fine Sand		8		
Silt & Clay		38		
Coarse Sand Ratio		0.3		
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)				
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	33.0		
	P.I.	12.0		
	LS%	5.6		
GM		2.19		
CLASSIFI - CATION	H.R.B.*	A-2-6(0)		
	COLTO*	<G9		
	T.R.H. 14*	G10		
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)				
MOD AASHTO (SANS GR30)	OMC%	6.8		
	MDD(KG/M³)	2091		
	COMP MC %	6.6		
	% SWELL	0.23		
C.B.R. (SANS GR40)	100%	8		
	98%	8		
	97%	7		
	95%	7		
U.C.S. (SANS GR53)	93%	5		
	90%	3		
	MOD ITS : DRY (kPa) (GR54)		N/A	
ITS @ 95% : DRY (kPa)		N/A		
STABILISED WITH	IN LAB	-		
	ON SITE	Neat		
TEST TYPE		CBR		
SAMPLED BY		Roadlab - Rabelani		
DELIVERED BY		Roadlab - Rabelani		
SAMPLING METHOD		TMH5 - MA2		
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot		
REMARKS & NOTES		None		

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation
 SANAS Accredited Laboratory No. T 0296
 The samples were subjected to analysis according to SANS 3001
 The results reported relate only to the sample tested
 Further use of the above information is not the responsibility or liability of Roadlab
 Documents may only be reproduced or published in their full context
 Compiled By : Chanel van Biljon

Mr. N Herbst
 TECHNICAL SIGNATORY

Mr. D Juckers

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

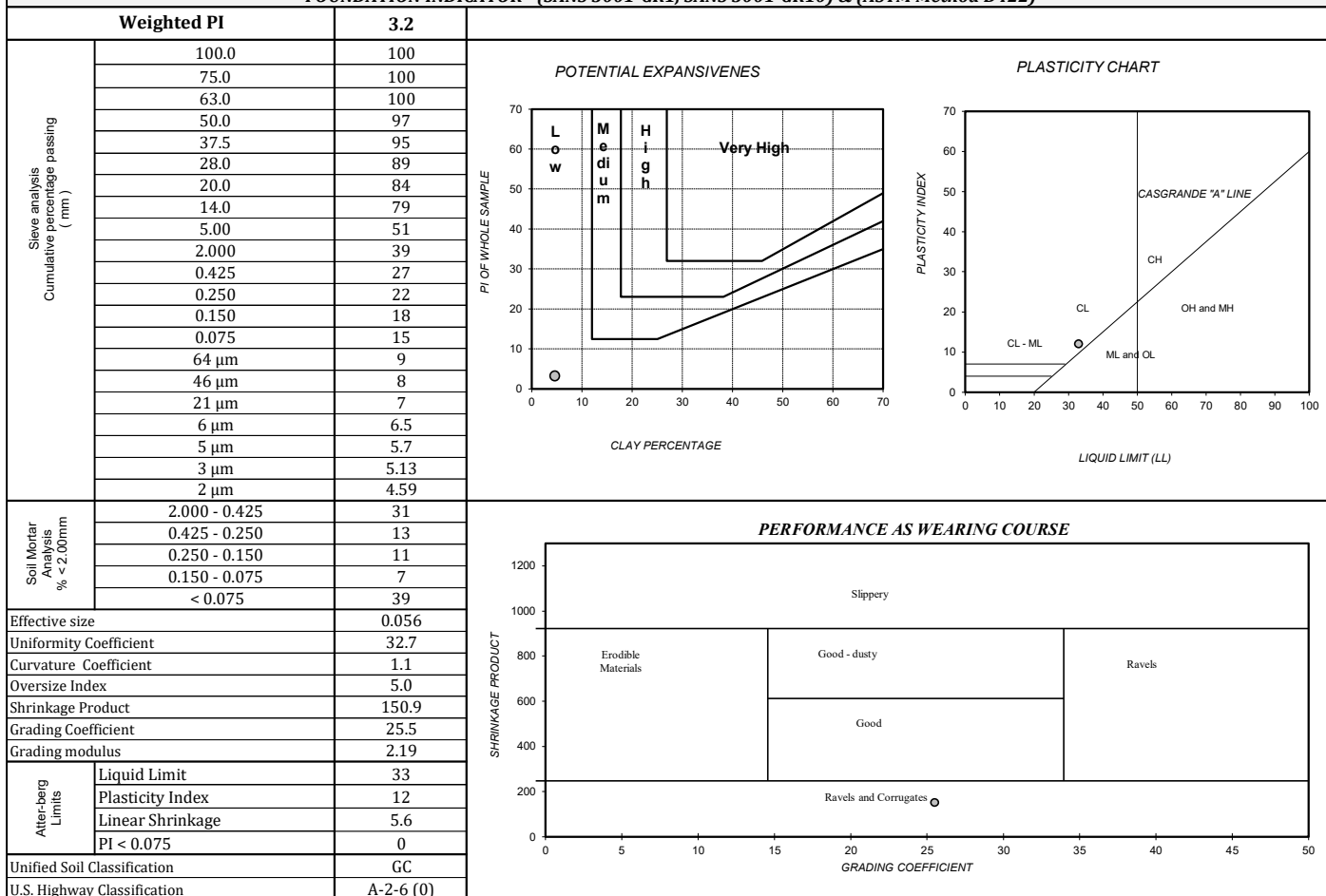
POSITION : TP05

LAYER : 800-1200mm

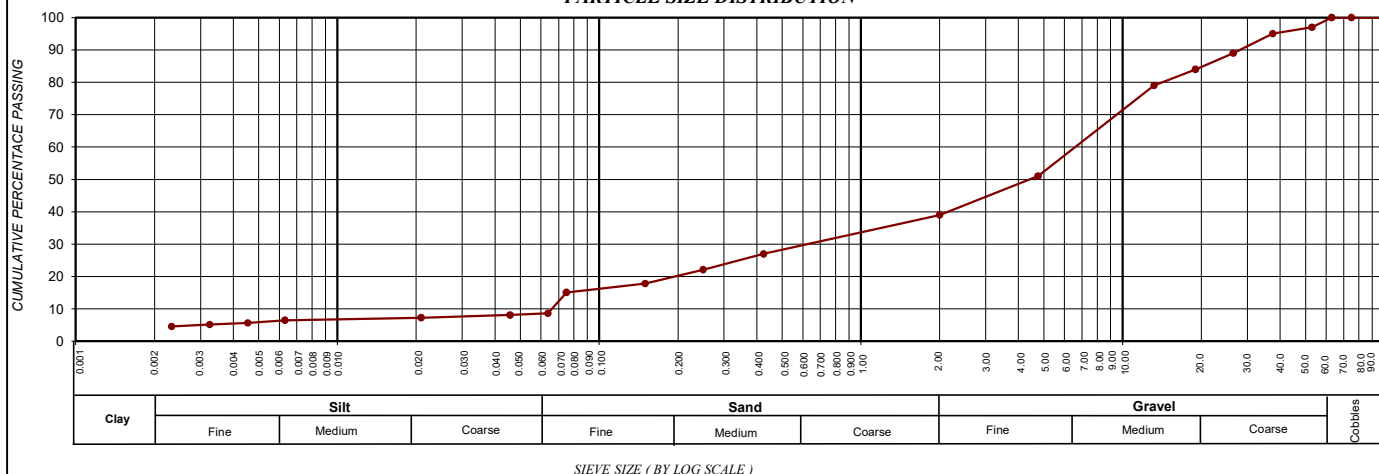
SAMPLE No. : S/4243

SAMPLE DESCRIPTION : Light Red Orange, Quartz & Ferricrete
Sandy Gravel

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)



PARTICLE SIZE DISTRIBUTION



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
4.6	5.6	28.8	61.0

Client: Makone Consulting Engineers

TP No. 06

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,40	Dry, Brown, Medium Dense, Intact, Silty Sandy Gravel , Transported.
			1,00	Dry, Light Orange Brown, Dense, Intact, Silty Clayey Sand , Transported. PI:9 GM:0.90 CBR@95%:2 Colto Classification:<G9
			1,10	Dry, Light Olive Orange, Dense to Very Dense, Intact, Sandy Gravel , Transported.

Note 1: RI = Road Indicator
Note 3: FC = Full Classification

Note 2: FI = Foundation Indicator
Note 4: TLB Refused

Profiled By: Rabelanie
Excavation method: TLB

Coordinates: S23°55,11'71
: E29°28,2'50

91594

2019/09/02

Makone Consulting Engineers
 P.O Box
 Address
 Area
 Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
 The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES				
SAMPLE No.	2019/S4244			
CONTAINER USED FOR SAMPLING	Clients Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP06			
LAYER TESTED / SAMPLED FROM	400-1000mm			
DATE SAMPLED	2019/08/24			
DATE RECEIVED	2019/08/24			
CLIENTS MARKING	None			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Dark Red Orange Silty Clayey Sand			
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)				
SIEVE	75.0	100		
	63.0	100		
ANA -	50.0	100		
	37.5	100		
	28.0	100		
	20.0	100		
LYSIS (mm)	14.0	100		
	5.00	100		
	2.00	96		
(SANS GR1:2010)	0.425	76		
	0.075	38		
SANS 3001 - PR5				
Soil Mortar	96			
Coarse Sand	21			
Fine Sand	14			
Coarse Fine Sand	14			
Medium Fine Sand	16			
Fine Fine Sand	10			
Silt & Clay	40			
Coarse Sand Ratio	0.2			
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)				
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	29.0		
	P.I.	9.0		
	LS%	4.0		
GM		0.90		
CLASSIFI - CATION	H.R.B.*	A-4(0)		
	COLTO*	<G9		
	T.R.H. 14*	G10		
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)				
MOD AASHTO (SANS GR30)	OMC%	10.4		
	MDD(KG/M³)	1947		
	COMP MC %	10.2		
C.B.R. (SANS GR40)	% SWELL	0.35		
	100%	3		
	98%	3		
	97%	2		
U.C.S. (SANS GR53)	95%	2		
	93%	2		
	90%	2		
MOD ITS : DRY (kPa) (GR54)		N/A		
ITS @ 95% : DRY (kPa)		N/A		
STABILISED WITH	IN LAB	-		
	ON SITE	Neat		
TEST TYPE		CBR		
SAMPLED BY		Roadlab - Rabelani		
DELIVERED BY		Roadlab - Rabelani		
SAMPLING METHOD		TMH5 - MA2		
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot		
REMARKS & NOTES		None		

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation
 SANAS Accredited Laboratory No. T 0296
 The samples were subjected to analysis according to SANS 3001
 The results reported relate only to the sample tested
 Further use of the above information is not the responsibility or liability of Roadlab
 Documents may only be reproduced or published in their full context
 Compiled By : Chanel van Biljon

Mr. N Herbst
 TECHNICAL SIGNATORY

Mr. D Juckers

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

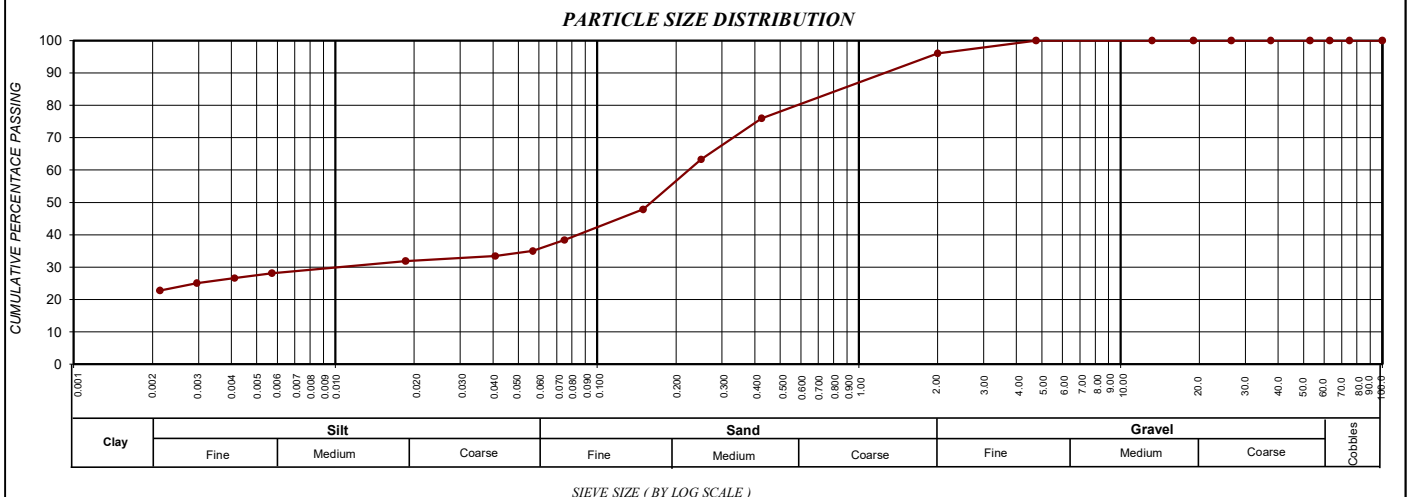
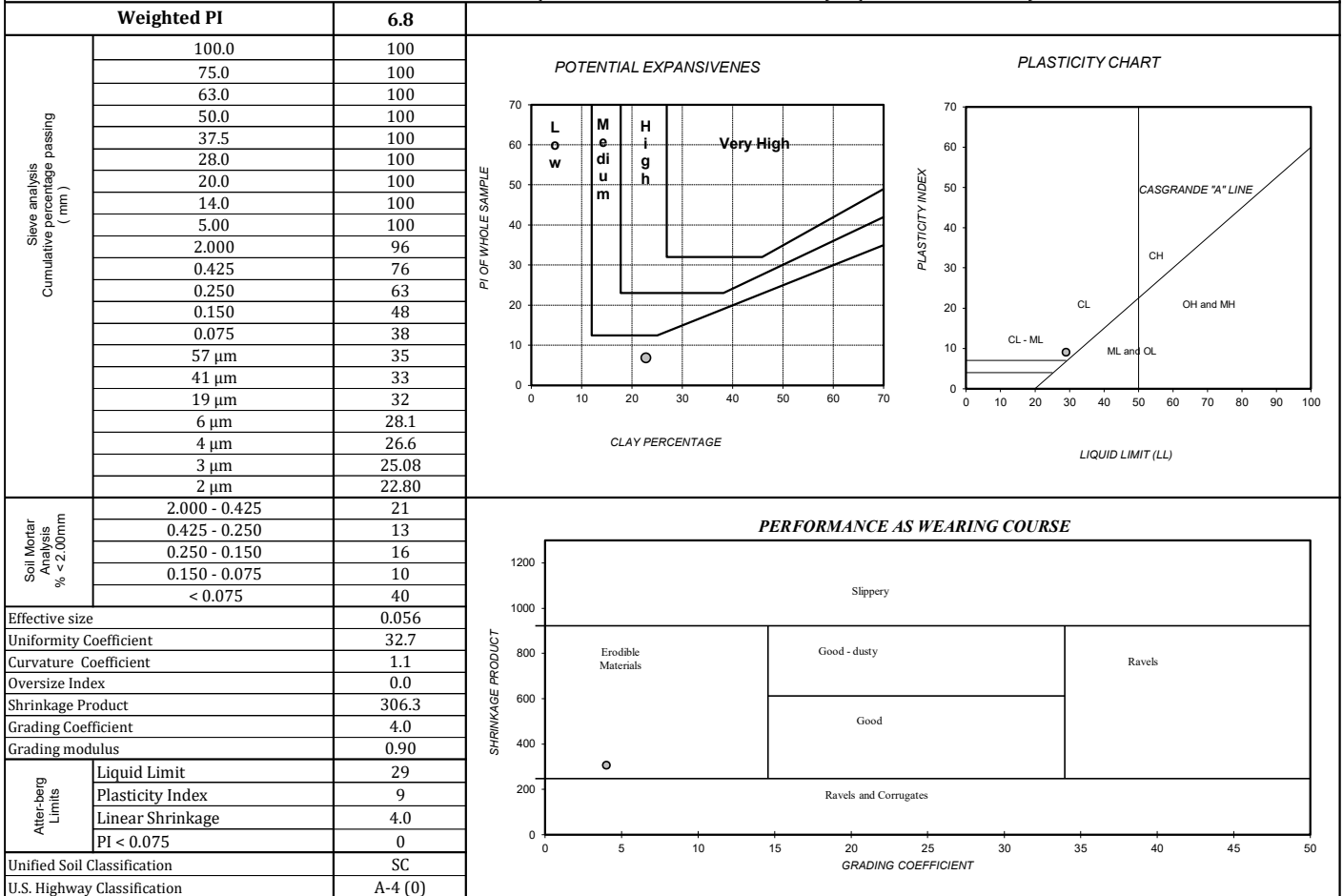
POSITION : TP06

LAYER : 400-1000mm

SAMPLE No. : S/4244

SAMPLE DESCRIPTION : Dark Red Orange, Quartzitic Sand
Silty Clayey Sand

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
22.8	13.0	60.2	4.0

Client: Makone Consulting Engineers

TP No. 07

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,40	Dry, Brown, Medium Dense, Intact, Silty Sand , Transported.
			1,00	Dry, White, Medium Dense to Dense, Intact, Sandy Gravel , Residual. PI:8 GM:1.85 CBR@95%:16 Colto Classification:G8

Note 1: RI = Road Indicator
Note 3: FC = Full Classification

Note 2: FI = Foundation Indicator
Note 4: TLB Refused

Profiled By: Rabelanie
Excavation method: TLB

Coordinates: S23°55,09'1
: E29°28,1'13

91594

2019/09/02

Makone Consulting Engineers
P.O Box
Address
Area
Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES					
SAMPLE No.		2019/S4245			
CONTAINER USED FOR SAMPLING		Clients Bags			
SIZE / WEIGHT OF SAMPLE		±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL		Slightly Moist			
HOLE No. / Km. / CHAINAGE		TP07			
LAYER TESTED / SAMPLED FROM		400-1000mm			
DATE SAMPLED		2019/08/24			
DATE RECEIVED		2019/08/24			
CLIENTS MARKING		None			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Light Brown Sandy Gravel			
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)					
SIEVE	75.0	100			
	63.0	95			
	50.0	94			
ANA -	37.5	89			
	28.0	87			
	20.0	86			
LYSIS (mm)	14.0	84			
	5.00	64			
	2.00	56			
(SANS GR1:2010)	0.425	39			
	0.075	20			
SANS 3001 - PR5					
Soil Mortar		56			
Coarse Sand		30			
Fine Sand		34			
Coarse Fine Sand		13			
Medium Fine Sand		13			
Fine Fine Sand		9			
Silt & Clay		36			
Coarse Sand Ratio		0.3			
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)					
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	40.0			
	P.I.	8.0			
	LS%	3.8			
GM		1.85			
CLASSIFI - CATION	H.R.B.*	A-2-4(0)			
	COLTO*	G8			
	T.R.H. 14*	G8			
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)					
MOD AASHTO (SANS GR30)	OMC%	11.3			
	MDD(KG/M³)	1842			
	COMP MC %	11.1			
C.B.R. (SANS GR40)	% SWELL	0.30			
	100%	34			
	98%	27			
U.C.S. (SANS GR53)	97%	23			
	95%	16			
	93%	14			
MPA	90%	11			
MOD ITS : DRY (kPa) (GR54)		N/A			
ITS @ 95% : DRY (kPa)		N/A			
STABILISED WITH	IN LAB	-			
	ON SITE	Neat			
TEST TYPE		CBR			
SAMPLED BY		Roadlab - Rabelani			
DELIVERED BY		Roadlab - Rabelani			
SAMPLING METHOD		TMH5 - MA2			
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot			
REMARKS & NOTES		None			

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No. T 0296
The samples were subjected to analysis according to SANS 3001
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Chanel van Biljon

Mr. N Herbst
TECHNICAL SIGNATORY

Mr. D Juckers

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

POSITION : TP07

LAYER : 400-1000mm

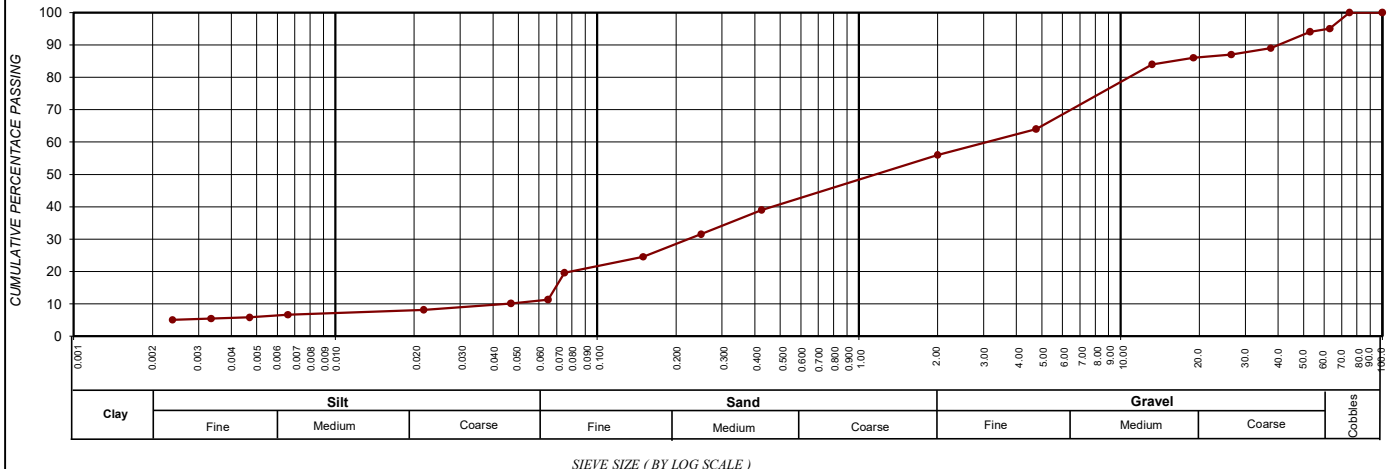
SAMPLE No. : S/4245

SAMPLE DESCRIPTION : Light Brown, Calcrete
Sandy Gravel

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)

Weighted PI		3.1		
Sieve analysis Cumulative percentage passing (mm)	100.0	100	POTENTIAL EXPANSIVENES CLAY PERCENTAGE PLASTICITY CHART LIQUID LIMIT (LL)	
	75.0	100		
	63.0	95		
	50.0	94		
	37.5	89		
	28.0	87		
	20.0	86		
	14.0	84		
	5.00	64		
	2.000	56		
	0.425	39		
	0.250	32		
	0.150	25		
	0.075	20		
	65 µm	11		
	47 µm	10		
	22 µm	8		
	7 µm	6.6		
Soil Mortar Analysis % < 2.00mm	2.000 - 0.425	30	PERFORMANCE AS WEARING COURSE GRADING COEFFICIENT	
	0.425 - 0.250	13		
	0.250 - 0.150	12		
	0.150 - 0.075	9		
	< 0.075	35		
Effective size		0.056		
Uniformity Coefficient		32.7		
Curvature Coefficient		1.1		
Oversize Index		11.0		
Shrinkage Product		154.4		
Grading Coefficient		19.8		
Grading modulus		1.85		
Atter-berg Limits	Liquid Limit	40		
	Plasticity Index	8		
	Linear Shrinkage	4.0		
	PI < 0.075	0		
Unified Soil Classification		SM		
U.S. Highway Classification		A-2-4 (0)		

PARTICLE SIZE DISTRIBUTION



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
5.1	8.2	42.8	44.0

Client: Makone Consulting Engineers

TP No. 08

Date: 2019/09/05

Project: International Softball Stadium in Polokwane (New Site)

Ch:

Project No: 91594

Carriage way:

Photo	Symbol	Sample	Depth (m)	Description
			0,20	Dry, Brown, Medium Dense, Intact, Silty Sandy Gravel , Transported.
			1,00	Slightly Moist, Dark Red Brown, Dense, Intact, Clayey Silty Sand , Transported. PI:15 GM:0.94 CBR@95%:4 Colto Classification:<G9
			1,10	Dry, Light Red Orange, Dense to Very Dense, Intact, Sandy Gravel , Transported.

Note 1: RI = Road Indicator
Note 3: FC = Full Classification

Note 2: FI = Foundation Indicator
Note 4: TLB Refused

Profiled By: Rabelanie
Excavation method: TLB

Coordinates: S23°55,09'65
: E29°28,5'40

91594

2019/09/02

Makone Consulting Engineers
P.O Box
Address
Area
Code

Dear Sir

Test Report : INTERNATIONAL SOFTBALL STADIUM IN POLOKWANE NEW - CBR TEST RESULTS

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE INFORMATION & PROPERTIES				
SAMPLE No.	2019/S4246			
CONTAINER USED FOR SAMPLING	Clients Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP08			
LAYER TESTED / SAMPLED FROM	200-1000mm			
DATE SAMPLED	2019/08/24			
DATE RECEIVED	2019/08/24			
CLIENTS MARKING	None			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Dark Red Brown Clayey Silty Sand			
GRADING ANALYSIS - % PASSING SIEVES (SANS : METHOD GR1:2010)				
SIEVE	75.0	100		
	63.0	100		
ANA -	50.0	100		
	37.5	100		
	28.0	100		
	20.0	100		
LYSIS (mm)	14.0	100		
	5.00	99		
	2.00	96		
	0.425	78		
(SANS GR1:2010)	0.075	32		
SANS 3001 - PR5				
Soil Mortar		96		
Coarse Sand		19		
Fine Sand		48		
Coarse Fine Sand		34		
Medium Fine Sand		16		
Fine Fine Sand		14		
Silt & Clay		33		
Coarse Sand Ratio		0.1		
ATTERBERG LIMITS ANALYSIS (SANS : METHOD GR10 ; GR11)				
ATTERBERG LIMITS (SANS GR10; GR11)	LL%	32.0		
	P.I.	15.0		
	LS%	6.6		
GM		0.94		
CLASSIFI - CATION	H.R.B.*	A-2-6(0)		
	COLTO*	<G9		
	T.R.H. 14*	G10		
CALIFORNIA BEARING RATIO (SANS : METHOD GR40) / UNCONFINED COMPRESSIVE STRENGTH (SANS : METHOD GR53) (ITS GR54)				
MOD AASHTO (SANS GR30)	OMC%	15.3		
	MDD(KG/M³)	1852		
	COMP MC %	15.1		
	% SWELL	0.38		
C.B.R. (SANS GR40)	100%	6		
	98%	5		
	97%	5		
U.C.S. (SANS GR53)	95%	4		
	93%	3		
MPA	90%	2		
MOD ITS : DRY (kPa) (GR54)		N/A		
ITS @ 95% : DRY (kPa)		N/A		
STABILISED WITH	IN LAB	-		
	ON SITE	Neat		
TEST TYPE		CBR		
SAMPLED BY		Roadlab - Rabelani		
DELIVERED BY		Roadlab - Rabelani		
SAMPLING METHOD		TMH5 - MA2		
ENVIRONMENTAL CONDITION WHEN SAMPLED		Hot		
REMARKS & NOTES		None		

Kind Regards

Remarks:

*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No. T 0296
The samples were subjected to analysis according to SANS 3001
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Chanel van Biljon

Mr. N Herbst
TECHNICAL SIGNATORY

Mr. D Juckers

OUR REF : 91594

CLIENT : Makone Consulting Engineers

PROJECT : International Softball Stadium in Polokwane New

DATE RECEIVED : 2019/08/24

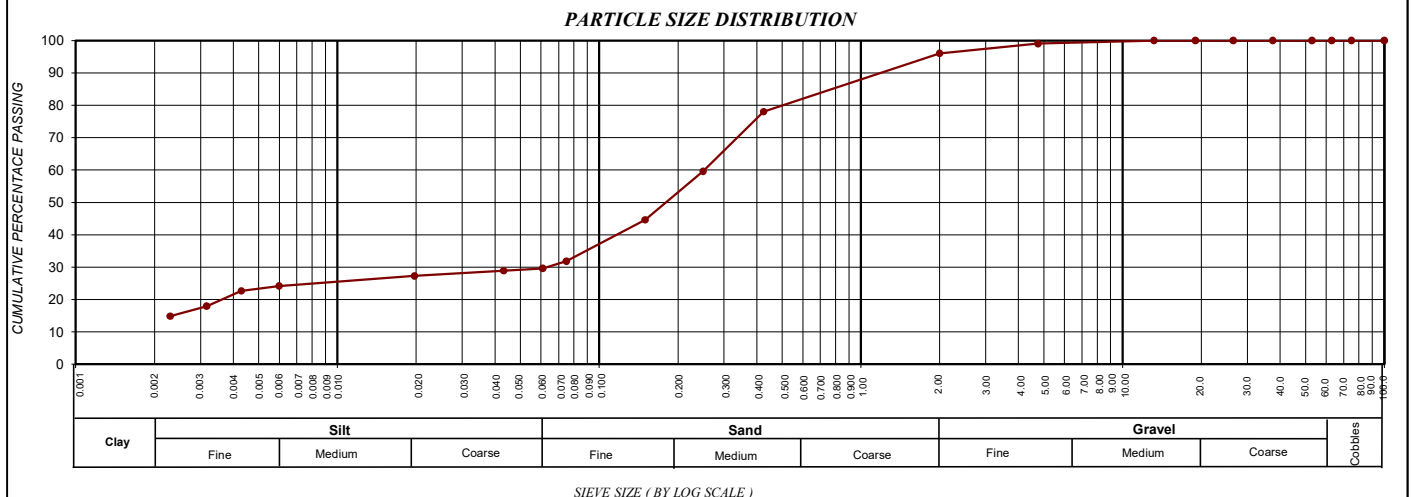
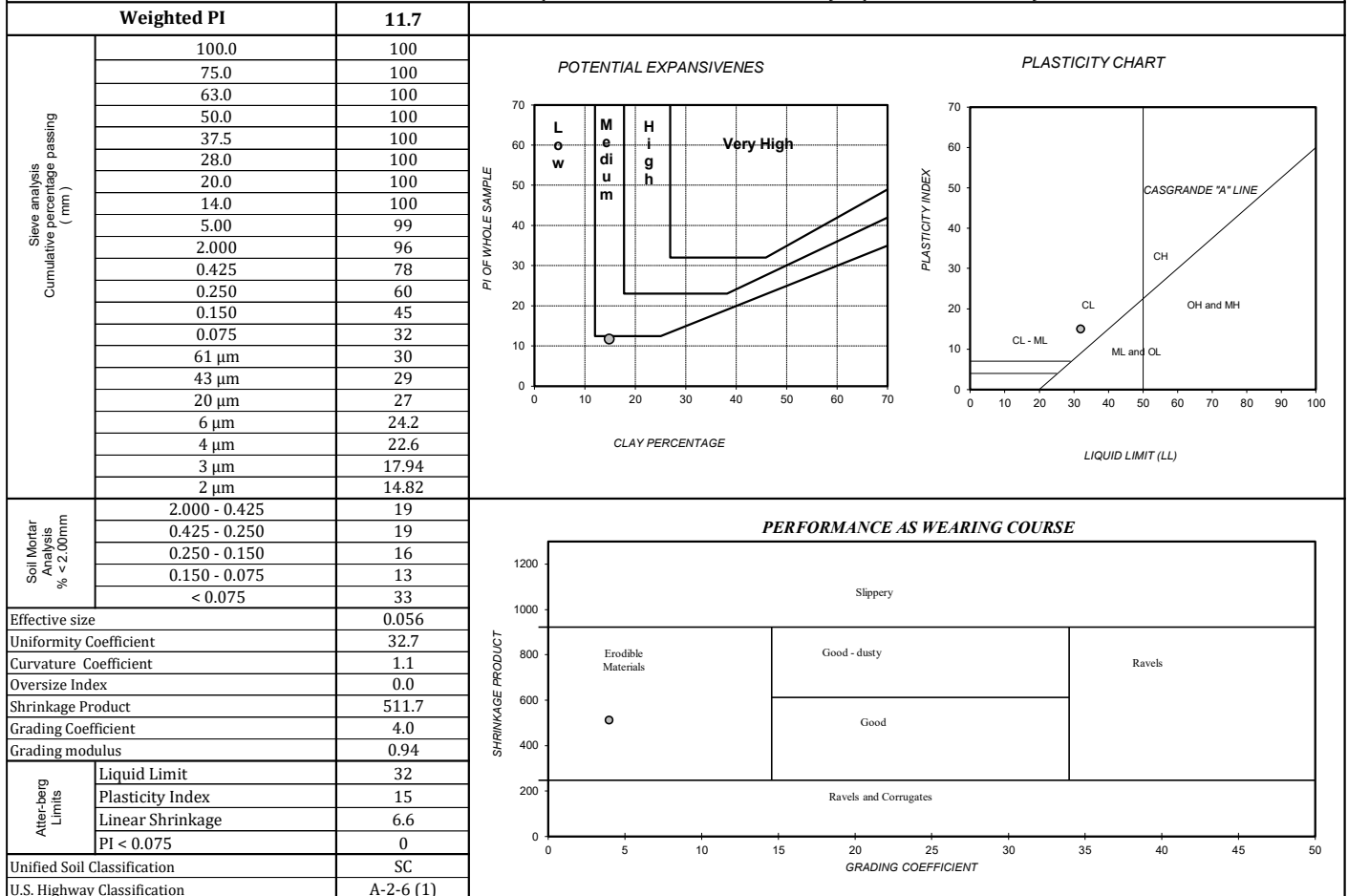
POSITION : TP08

LAYER : 200-1000mm

SAMPLE No. : S/4246

SAMPLE DESCRIPTION : Dark Red Brown, Ferricrete & Quartzitic Sand
Clayey Silty Sand

FOUNDATION INDICATOR - (SANS 3001-GR1, SANS 3001-GR10) & (ASTM Method D422)



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
14.8	15.5	65.7	4.0

Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 1	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	25	0mm	0	0					
5	60	35mm	35	7.0	Dense	136	35	36	348
10	90	65mm	30	6.0	Dense	152	42	44	411
15	125	100mm	35	7.0	Dense	136	35	36	348
20	158	133mm	33	6.6	Dense	142	37	39	371
25	198	173mm	40	8.0	Dense	123	29	31	301
30	233	208mm	35	7.0	Dense	136	35	36	348
35	271	246mm	38	7.6	Dense	128	31	33	318
40	306	281mm	35	7.0	Dense	136	35	36	348
45	341	316mm	35	7.0	Dense	136	35	36	348
50	371	346mm	30	6.0	Dense	152	42	44	411
55	401	376mm	30	6.0	Dense	152	42	44	411
60	438	413mm	37	7.4	Dense	130	32	34	327
65	474	449mm	36	7.2	Dense	133	33	35	337
70	503	478mm	29	5.8	Dense	156	44	46	427
75	528	503mm	25	5.0	Very Dense	173	53	56	502
80	552	527mm	24	4.8	Very Dense	179	56	59	525
85	574	549mm	22	4.4	Very Dense	190	62	66	577
90	591	566mm	17	3.4	Very Dense	>200	87	92	764
95	612	587mm	21	4.2	Very Dense	197	66	70	607
100	633	608mm	21	4.2	Very Dense	197	66	70	607
105	660	635mm	27	5.4	Dense	164	48	51	461
110	688	663mm	28	5.6	Dense	160	46	48	443
115	713	688mm	25	5.0	Very Dense	173	53	56	502
120	741	716mm	28	5.6	Dense	160	46	48	443
125	773	748mm	32	6.4	Dense	145	39	41	383
130	813	788mm	40	8.0	Dense	123	29	31	301
135	858	833mm	45	9.0	Dense	113	25	26	264
140	905	880mm	47	9.4	Dense	109	24	25	252
145	928	903mm	23	4.6	Very Dense	184	59	62	550
150	946	921mm	18	3.6	Very Dense	>200	81	86	718
155	960	935mm	14	2.8	Very Dense	>200	111	>110	944
160	975	950mm	15	3.0	Very Dense	>200	102	108	876
165	987	962mm	12	2.4	Very Dense	>200	135	>110	1117
170	1000	975mm	13	2.6	Very Dense	>200	122	>110	1023

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 1

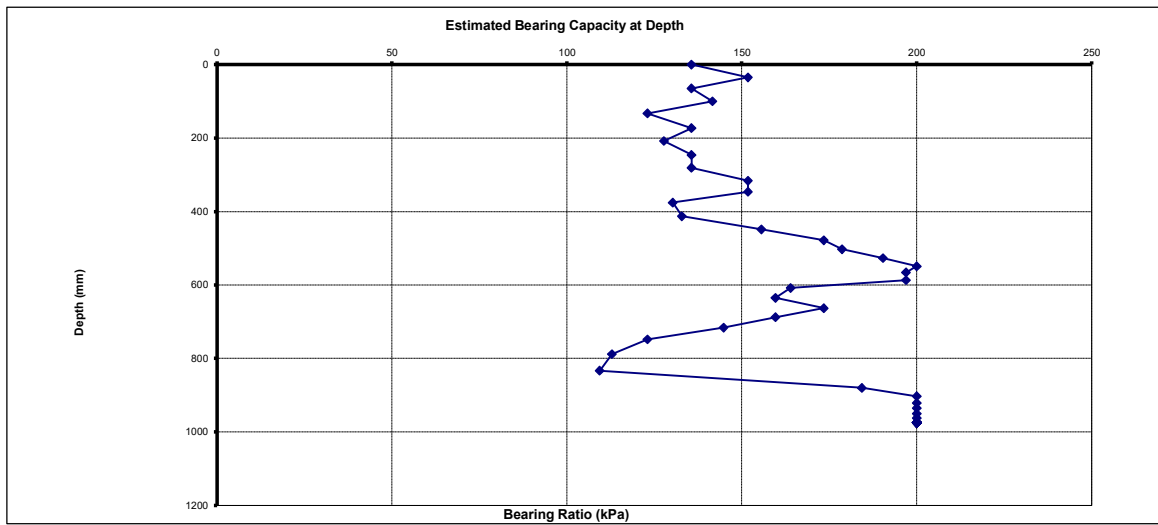
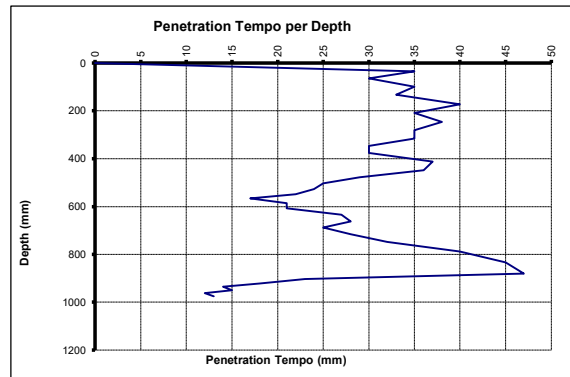
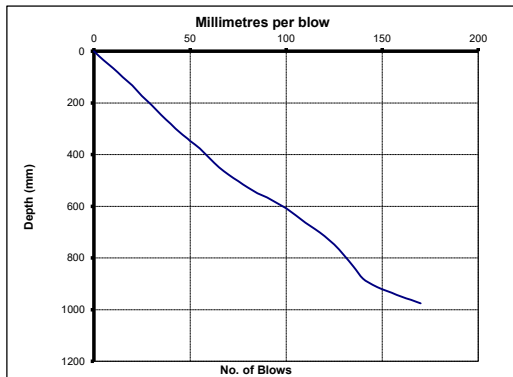
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE:



ROADLAB

(PTY) LTD . M2011/005423/07 . VAT 4670261090
Civil Engineering Materials Testing Laboratory
Established 2011



CENTURION BRANCH
Tel: 012 666 7092
Tel: 012 666 7267
121 Ellman Street
Sunderland Ridge
Pretoria
Centurion
0157
centurion@roadlab.co.za

Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 2	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @155mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	10	0mm	0	0					
5	50	40mm	40	8.0	Dense	123	29	31	301
10	63	53mm	13	2.6	Very Dense	>200	122	>110	1023
15	77	67mm	14	2.8	Very Dense	>200	111	>110	944
20	84	74mm	7	1.4	Very Dense	>200	232	>110	2010
25	90	80mm	6	1.2	Very Dense	>200	263	>110	2377
30	97	87mm	7	1.4	Very Dense	>200	232	>110	2010
35	103	93mm	6	1.2	Very Dense	>200	263	>110	2377
40	110	100mm	7	1.4	Very Dense	>200	232	>110	2010
45	114	104mm	4	0.8	Very Dense	>200	342	>110	3699
50	125	115mm	11	2.2	Very Dense	>200	151	>110	1228
55	131	121mm	6	1.2	Very Dense	>200	263	>110	2377
60	134	124mm	3	0.6	Very Dense	>200	389	>110	5061
65	138	128mm	4	0.8	Very Dense	>200	342	>110	3699
70	151	141mm	13	2.6	Very Dense	>200	122	>110	1023
75	155	145mm	4	0.8	Very Dense	>200	342	>110	3699
80	157	147mm	2	0.4	Very Dense	>200	442	>110	7873
85	162	152mm	5	1.0	Very Dense	>200	300	>110	2900
90	163	153mm	1	0.2	Very Dense	>200	500	>110	16760
95	165	155mm	2	0.4	Very Dense	>200	442	>110	7873

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 2

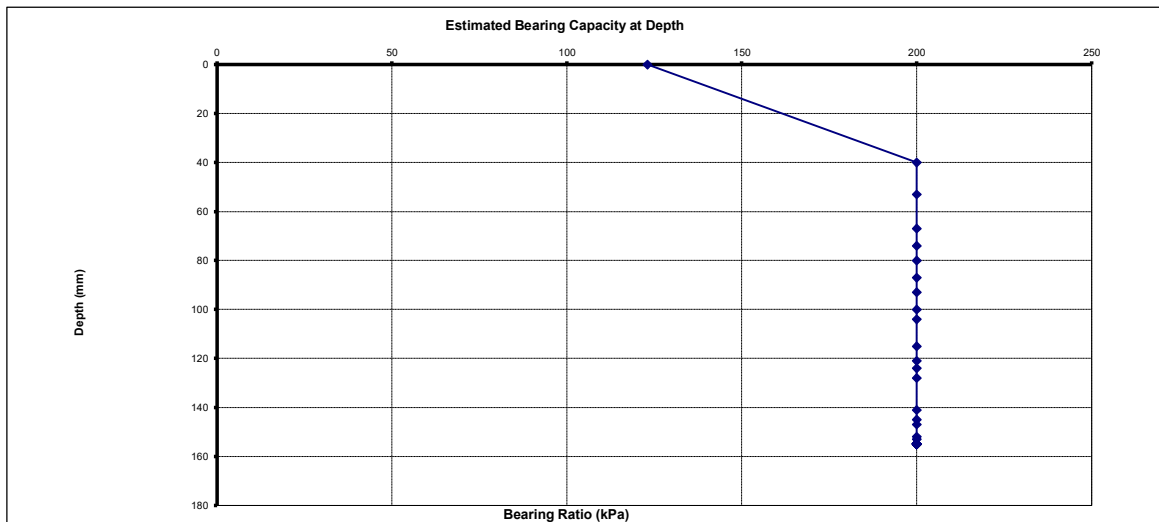
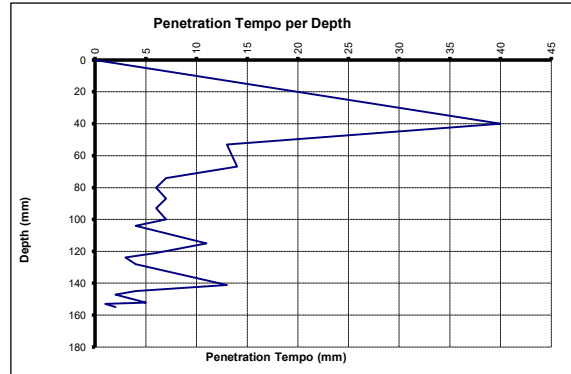
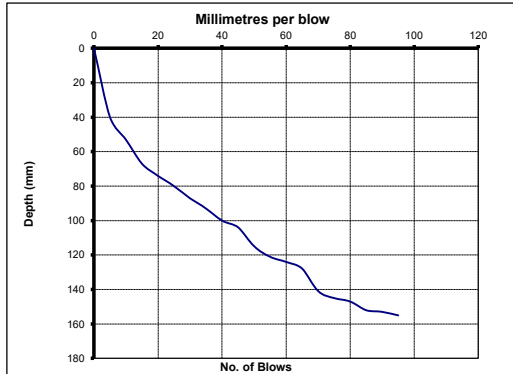
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @155mm



ROADLAB

(PTY) LTD . M2011/005423/07 . VAT 4670261090
Civil Engineering Materials Testing Laboratory
Established 2011



CENTURION BRANCH
Tel: 012 666 7092
Tel: 012 666 7267
121 Ellman Street
Sunderland Ridge
Pretoria
Centurion
0157
centurion@roadlab.co.za

Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 2- Retest	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @128mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	25	0mm	0	0					
5	54	29mm	29	5.8	Dense	156	44	46	427
10	74	49mm	20	4.0	Very Dense	200	70	75	640
15	82	57mm	8	1.6	Very Dense	>200	206	>110	1737
20	85	60mm	3	0.6	Very Dense	>200	389	>110	5061
25	90	65mm	5	1.0	Very Dense	>200	300	>110	2900
30	95	70mm	5	1.0	Very Dense	>200	300	>110	2900
35	101	76mm	6	1.2	Very Dense	>200	263	>110	2377
40	105	80mm	4	0.8	Very Dense	>200	342	>110	3699
45	113	88mm	8	1.6	Very Dense	>200	206	>110	1737
50	126	101mm	13	2.6	Very Dense	>200	122	>110	1023
55	128	103mm	2	0.4	Very Dense	>200	442	>110	7873
60	133	108mm	5	1.0	Very Dense	>200	300	>110	2900
65	137	112mm	4	0.8	Very Dense	>200	342	>110	3699
70	142	117mm	5	1.0	Very Dense	>200	300	>110	2900
75	155	130mm	13	2.6	Very Dense	>200	122	>110	1023
80	144	119mm	-11	-2.2	Very Dense	>200	1612	>110	#NUM!
85	147	122mm	3	0.6	Very Dense	>200	389	>110	5061
90	150	125mm	3	0.6	Very Dense	>200	389	>110	5061
95	153	128mm	3	0.6	Very Dense	>200	389	>110	5061

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 2- Retest

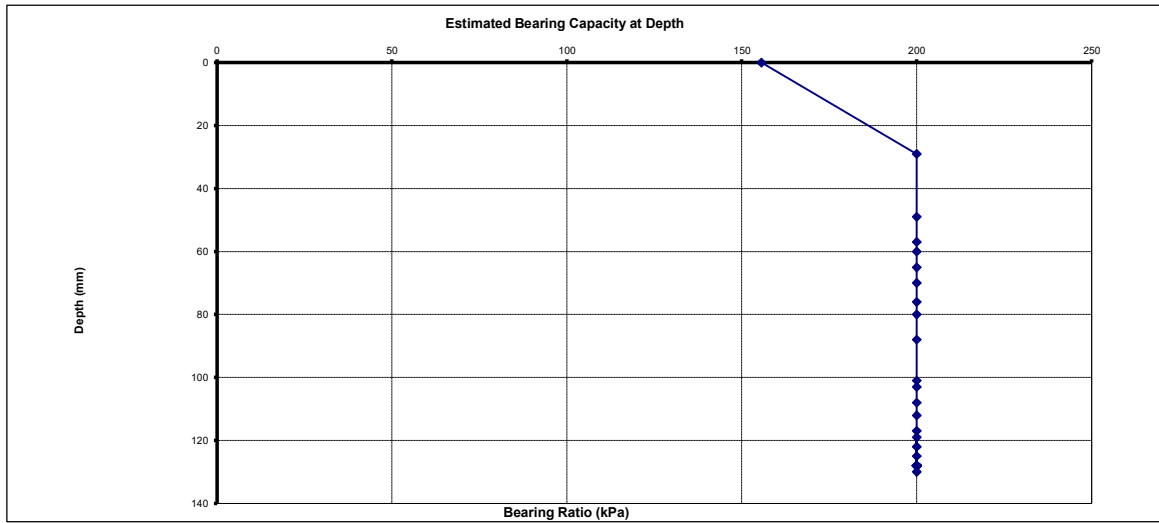
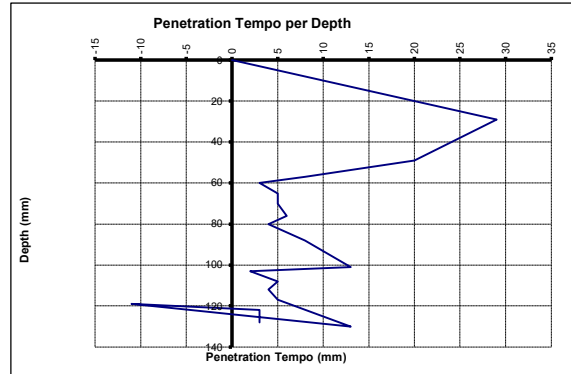
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @128mm



Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 3	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @155mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	10	0mm	0	0					
5	37	27mm	27	5.4	Dense	164	48	51	461
10	51	41mm	14	2.8	Very Dense	>200	111	>110	944
15	55	45mm	4	0.8	Very Dense	>200	342	>110	3699
20	62	52mm	7	1.4	Very Dense	>200	232	>110	2010
25	67	57mm	5	1.0	Very Dense	>200	300	>110	2900
30	68	58mm	1	0.2	Very Dense	>200	500	>110	16760
35	76	66mm	8	1.6	Very Dense	>200	206	>110	1737
40	81	71mm	5	1.0	Very Dense	>200	300	>110	2900
45	83	73mm	2	0.4	Very Dense	>200	442	>110	7873
50	84	74mm	1	0.2	Very Dense	>200	500	>110	16760
55	90	80mm	6	1.2	Very Dense	>200	263	>110	2377
60	95	85mm	5	1.0	Very Dense	>200	300	>110	2900
65	104	94mm	9	1.8	Very Dense	>200	185	>110	1528
70	121	111mm	17	3.4	Very Dense	>200	87	92	764
75	138	128mm	17	3.4	Very Dense	>200	87	92	764
80	155	145mm	17	3.4	Very Dense	>200	87	92	764
85	178	168mm	23	4.6	Very Dense	184	59	62	550
90	200	190mm	22	4.4	Very Dense	190	62	66	577
95	234	224mm	34	6.8	Dense	139	36	38	359
100	275	265mm	41	8.2	Dense	121	28	30	293
105	330	320mm	55	11.0	Dense	98	20	20	212
110	370	360mm	40	8.0	Dense	123	29	31	301
115	385	375mm	15	3.0	Very Dense	>200	102	108	876
120	388	378mm	3	0.6	Very Dense	>200	389	>110	5061
125	395	385mm	7	1.4	Very Dense	>200	232	>110	2010
130	402	392mm	7	1.4	Very Dense	>200	232	>110	2010
135	407	397mm	5	1.0	Very Dense	>200	300	>110	2900
140	415	405mm	8	1.6	Very Dense	>200	206	>110	1737
145	424	414mm	9	1.8	Very Dense	>200	185	>110	1528
150	435	425mm	11	2.2	Very Dense	>200	151	>110	1228
155	454	444mm	19	3.8	Very Dense	>200	75	80	677
160	468	458mm	14	2.8	Very Dense	>200	111	>110	944
165	487	477mm	19	3.8	Very Dense	>200	75	80	677
170	508	498mm	21	4.2	Very Dense	197	66	70	607
175	538	528mm	30	6.0	Dense	152	42	44	411
180	567	557mm	29	5.8	Dense	156	44	46	427
185	595	585mm	28	5.6	Dense	160	46	48	443
190	625	615mm	30	6.0	Dense	152	42	44	411
195	652	642mm	27	5.4	Dense	164	48	51	461
200	674	664mm	22	4.4	Very Dense	190	62	66	577
205	694	684mm	20	4.0	Very Dense	200	70	75	640
210	712	702mm	18	3.6	Very Dense	>200	81	86	718
215	726	716mm	14	2.8	Very Dense	>200	111	>110	944
220	740	730mm	14	2.8	Very Dense	>200	111	>110	944
225	752	742mm	12	2.4	Very Dense	>200	135	>110	1117
230	762	752mm	10	2.0	Very Dense	>200	170	>110	1362
235	773	763mm	11	2.2	Very Dense	>200	151	>110	1228
240	784	774mm	11	2.2	Very Dense	>200	151	>110	1228
245	795	785mm	11	2.2	Very Dense	>200	151	>110	1228
250	811	801mm	16	3.2	Very Dense	>200	94	100	816
255	828	818mm	17	3.4	Very Dense	>200	87	92	764
260	842	832mm	14	2.8	Very Dense	>200	111	>110	944
265	856	846mm	14	2.8	Very Dense	>200	111	>110	944
270	870	860mm	14	2.8	Very Dense	>200	111	>110	944
275	885	875mm	15	3.0	Very Dense	>200	102	108	876
280	900	890mm	15	3.0	Very Dense	>200	102	108	876

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 3

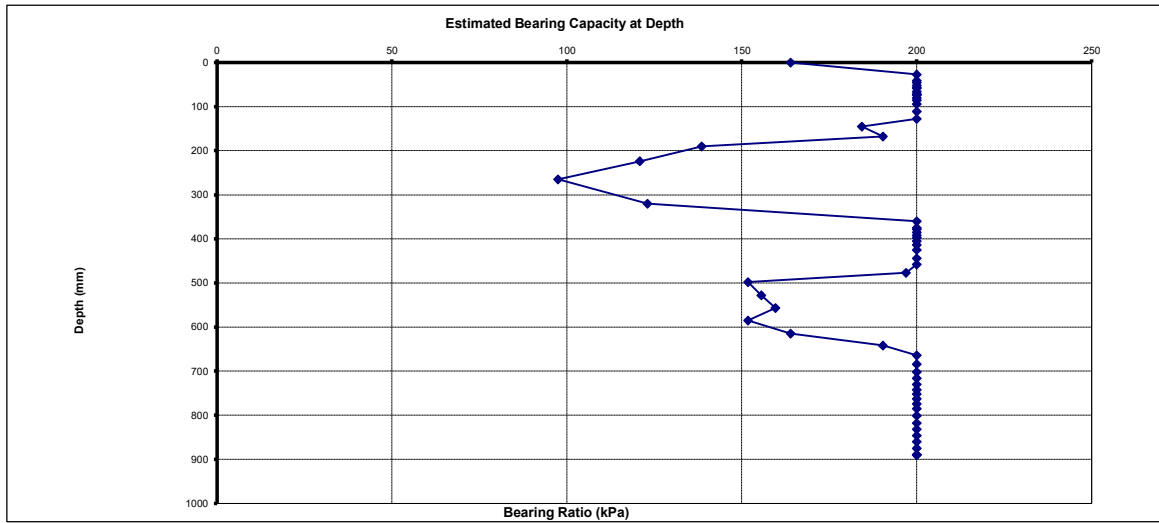
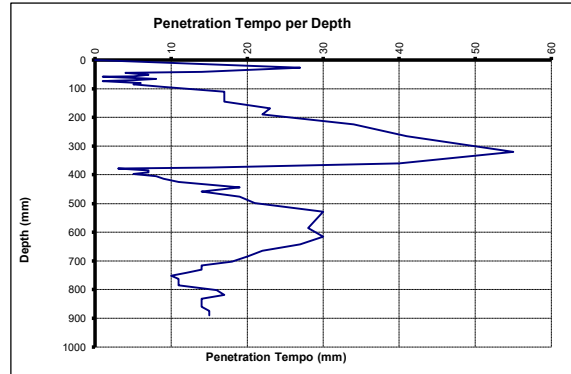
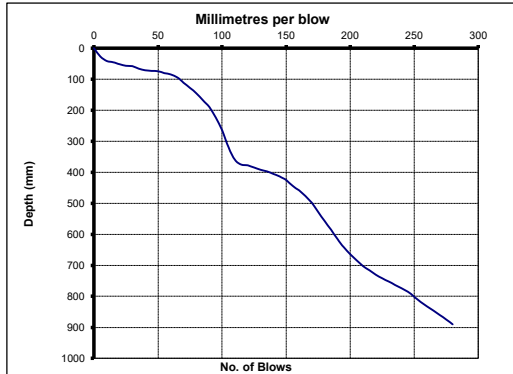
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @155mm



Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

NOTE: Refused @957mm

[illegible]

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 3

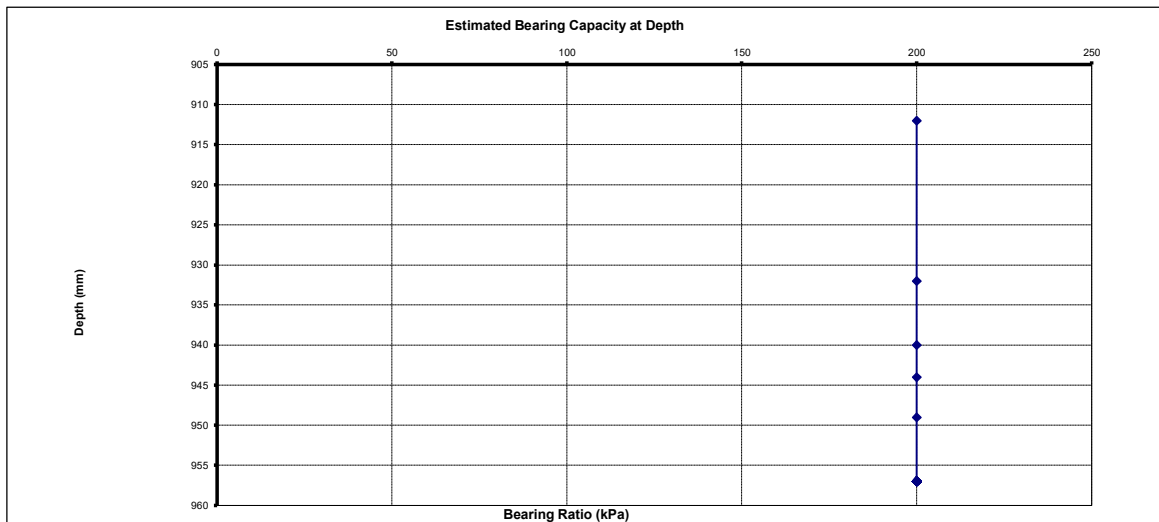
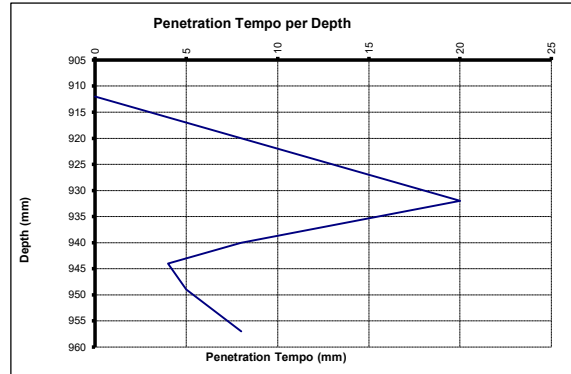
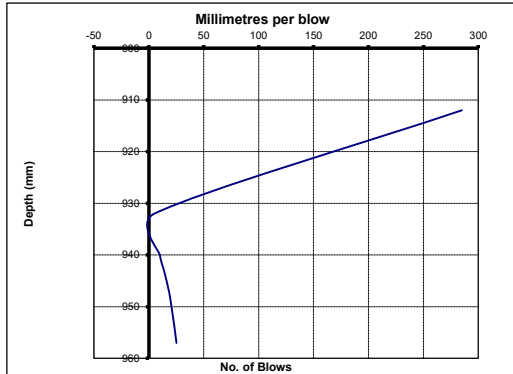
STARTING DEPTH: 912mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @957mm



ROADLAB

(PTY) LTD . M2011/005423/07 . VAT 4670261090
Civil Engineering Materials Testing Laboratory

Established 2011



CENTURION BRANCH
Tel: 012 666 7092
Tel: 012 666 7267
121 Ellman Street
Sunderland Ridge
Pretoria
Centurion
0157
centurion@roadlab.co.za

Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 4	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @65mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	15	0mm	0	0					
5	45	30mm	30	6.0	Dense	152	42	44	411
10	54	39mm	9	1.8	Very Dense	>200	185	>110	1528
15	56	41mm	2	0.4	Very Dense	>200	442	>110	7873
20	60	45mm	4	0.8	Very Dense	>200	342	>110	3699
25	64	49mm	4	0.8	Very Dense	>200	342	>110	3699
30	65	50mm	1	0.2	Very Dense	>200	500	>110	16760
35	68	53mm	3	0.6	Very Dense	>200	389	>110	5061
40	70	55mm	2	0.4	Very Dense	>200	442	>110	7873
45	73	58mm	3	0.6	Very Dense	>200	389	>110	5061
50	75	60mm	2	0.4	Very Dense	>200	442	>110	7873
55	80	65mm	5	1.0	Very Dense	>200	300	>110	2900

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 4

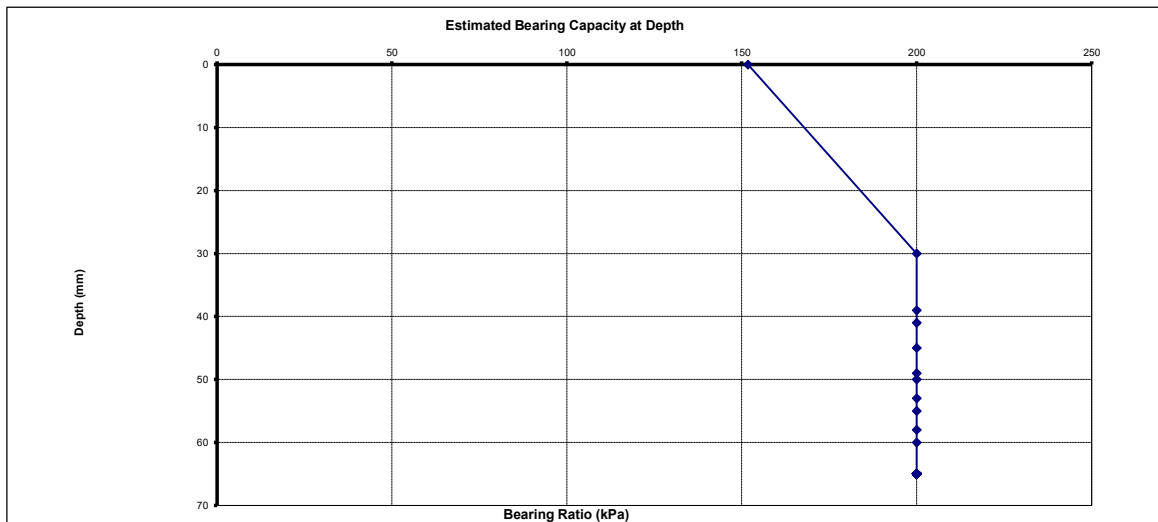
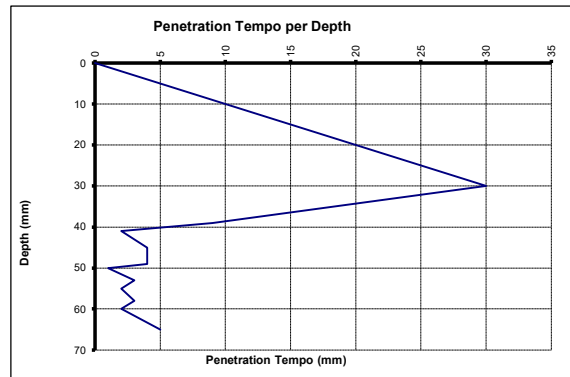
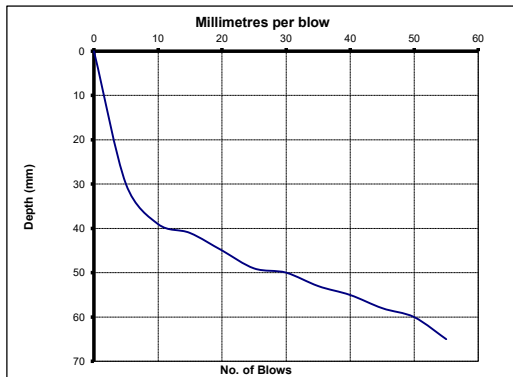
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @65mm



CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 4 Retest	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @985mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	15	0mm	0	0					
5	50	35mm	35	7.0	Dense	136	35	36	348
10	74	59mm	24	4.8	Very Dense	179	56	59	525
15	96	81mm	22	4.4	Very Dense	190	62	66	577
20	118	103mm	22	4.4	Very Dense	190	62	66	577
25	142	127mm	24	4.8	Very Dense	179	56	59	525
30	168	153mm	26	5.2	Dense	169	51	53	481
35	190	175mm	22	4.4	Very Dense	190	62	66	577
40	218	203mm	28	5.6	Dense	160	46	48	443
45	247	232mm	29	5.8	Dense	156	44	46	427
50	278	263mm	31	6.2	Dense	148	40	42	397
55	307	292mm	29	5.8	Dense	156	44	46	427
60	340	325mm	33	6.6	Dense	142	37	39	371
65	370	355mm	30	6.0	Dense	152	42	44	411
70	397	382mm	27	5.4	Dense	164	48	51	461
75	421	406mm	24	4.8	Very Dense	179	56	59	525
80	444	429mm	23	4.6	Very Dense	184	59	62	550
85	470	455mm	26	5.2	Dense	169	51	53	481
90	503	488mm	33	6.6	Dense	142	37	39	371
95	541	526mm	38	7.6	Dense	128	31	33	318
100	584	569mm	43	8.6	Dense	117	27	28	278
105	642	627mm	58	11.6	Dense	94	18	19	201
110	688	673mm	46	9.2	Dense	111	24	25	258
115	718	703mm	30	6.0	Dense	152	42	44	411
120	745	730mm	27	5.4	Dense	164	48	51	461
125	774	759mm	29	5.8	Dense	156	44	46	427
130	804	789mm	30	6.0	Dense	152	42	44	411
135	832	817mm	28	5.6	Dense	160	46	48	443
140	862	847mm	30	6.0	Dense	152	42	44	411
145	880	865mm	18	3.6	Very Dense	>200	81	86	718
150	894	879mm	14	2.8	Very Dense	>200	111	>110	944
155	904	889mm	10	2.0	Very Dense	>200	170	>110	1362
160	914	899mm	10	2.0	Very Dense	>200	170	>110	1362
165	922	907mm	8	1.6	Very Dense	>200	206	>110	1737
170	928	913mm	6	1.2	Very Dense	>200	263	>110	2377
175	937	922mm	9	1.8	Very Dense	>200	185	>110	1528
180	947	932mm	10	2.0	Very Dense	>200	170	>110	1362
185	954	939mm	7	1.4	Very Dense	>200	232	>110	2010
190	960	945mm	6	1.2	Very Dense	>200	263	>110	2377
195	968	953mm	8	1.6	Very Dense	>200	206	>110	1737
200	977	962mm	9	1.8	Very Dense	>200	185	>110	1528
205	983	968mm	6	1.2	Very Dense	>200	263	>110	2377
210	990	975mm	7	1.4	Very Dense	>200	232	>110	2010
215	997	982mm	7	1.4	Very Dense	>200	232	>110	2010
220	1000	985mm	3	0.6	Very Dense	>200	389	>110	5061

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 4 Retest

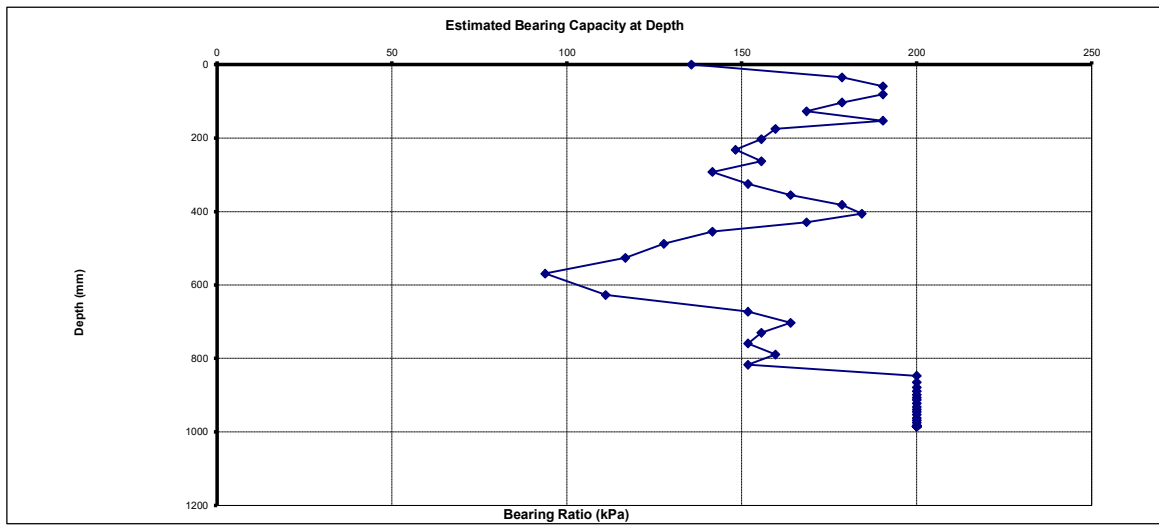
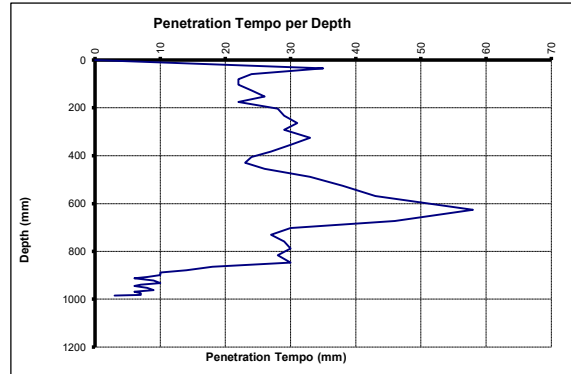
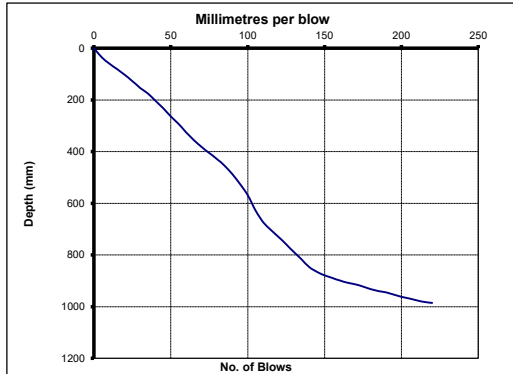
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @985mm



Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 6	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @155mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	20	0mm	0	0					
5	70	50mm	50	10.0	Dense	105	22	23	236
10	95	75mm	25	5.0	Very Dense	173	53	56	502
15	120	100mm	25	5.0	Very Dense	173	53	56	502
20	139	119mm	19	3.8	Very Dense	>200	75	80	677
25	181	161mm	42	8.4	Dense	119	27	29	285
30	190	170mm	9	1.8	Very Dense	>200	185	>110	1528
35	203	183mm	13	2.6	Very Dense	>200	122	>110	1023
40	225	205mm	22	4.4	Very Dense	190	62	66	577
45	245	225mm	20	4.0	Very Dense	200	70	75	640
50	266	246mm	21	4.2	Very Dense	197	66	70	607
55	288	268mm	22	4.4	Very Dense	190	62	66	577
60	312	292mm	24	4.8	Very Dense	179	56	59	525
65	336	316mm	24	4.8	Very Dense	179	56	59	525
70	365	345mm	29	5.8	Dense	156	44	46	427
75	384	364mm	19	3.8	Very Dense	>200	75	80	677
80	402	382mm	18	3.6	Very Dense	>200	81	86	718
85	419	399mm	17	3.4	Very Dense	>200	87	92	764
90	434	414mm	15	3.0	Very Dense	>200	102	108	876
95	449	429mm	15	3.0	Very Dense	>200	102	108	876
100	464	444mm	15	3.0	Very Dense	>200	102	108	876
105	478	458mm	14	2.8	Very Dense	>200	111	>110	944
110	496	476mm	18	3.6	Very Dense	>200	81	86	718
115	513	493mm	17	3.4	Very Dense	>200	87	92	764
120	530	510mm	17	3.4	Very Dense	>200	87	92	764
125	545	525mm	15	3.0	Very Dense	>200	102	108	876
130	561	541mm	16	3.2	Very Dense	>200	94	100	816
135	575	555mm	14	2.8	Very Dense	>200	111	>110	944
140	588	568mm	13	2.6	Very Dense	>200	122	>110	1023
145	603	583mm	15	3.0	Very Dense	>200	102	108	876
150	618	598mm	15	3.0	Very Dense	>200	102	108	876
155	632	612mm	14	2.8	Very Dense	>200	111	>110	944
160	645	625mm	13	2.6	Very Dense	>200	122	>110	1023
165	657	637mm	12	2.4	Very Dense	>200	135	>110	1117
170	672	652mm	15	3.0	Very Dense	>200	102	108	876
175	682	662mm	10	2.0	Very Dense	>200	170	>110	1362
180	696	676mm	14	2.8	Very Dense	>200	111	>110	944
185	702	682mm	6	1.2	Very Dense	>200	263	>110	2377
190	719	699mm	17	3.4	Very Dense	>200	87	92	764
195	728	708mm	9	1.8	Very Dense	>200	185	>110	1528
200	738	718mm	10	2.0	Very Dense	>200	170	>110	1362
205	745	725mm	7	1.4	Very Dense	>200	232	>110	2010
210	753	733mm	8	1.6	Very Dense	>200	206	>110	1737
215	762	742mm	9	1.8	Very Dense	>200	185	>110	1528
220	772	752mm	10	2.0	Very Dense	>200	170	>110	1362
225	781	761mm	9	1.8	Very Dense	>200	185	>110	1528
230	792	772mm	11	2.2	Very Dense	>200	151	>110	1228
235	805	785mm	13	2.6	Very Dense	>200	122	>110	1023
240	818	798mm	13	2.6	Very Dense	>200	122	>110	1023
245	830	810mm	12	2.4	Very Dense	>200	135	>110	1117
250	845	825mm	15	3.0	Very Dense	>200	102	108	876
255	858	838mm	13	2.6	Very Dense	>200	122	>110	1023
260	874	854mm	16	3.2	Very Dense	>200	94	100	816
265	888	868mm	14	2.8	Very Dense	>200	111	>110	944
270	903	883mm	15	3.0	Very Dense	>200	102	108	876
275	915	895mm	12	2.4	Very Dense	>200	135	>110	1117
280	925	905mm	10	2.0	Very Dense	>200	170	>110	1362

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 6

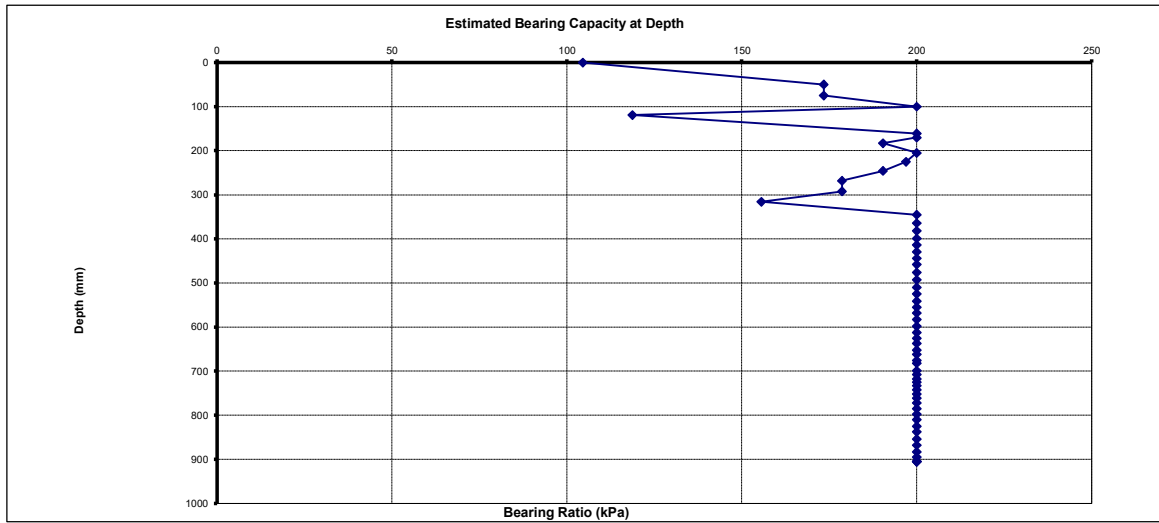
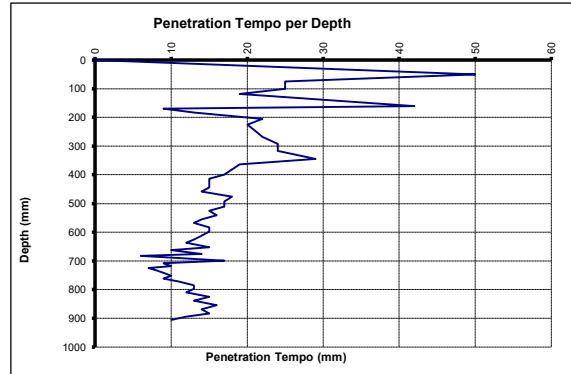
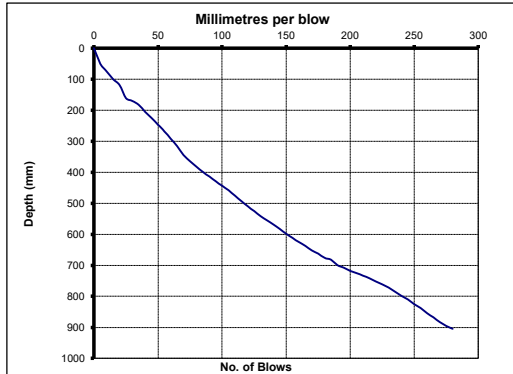
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @155mm



Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

NOTE: Refused @975mm

[illegible]

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 6

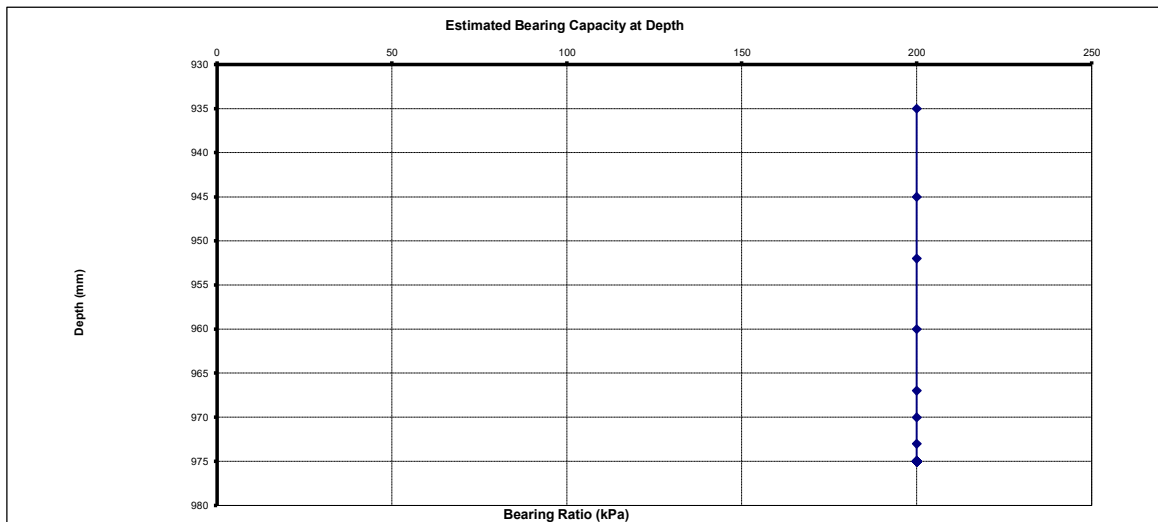
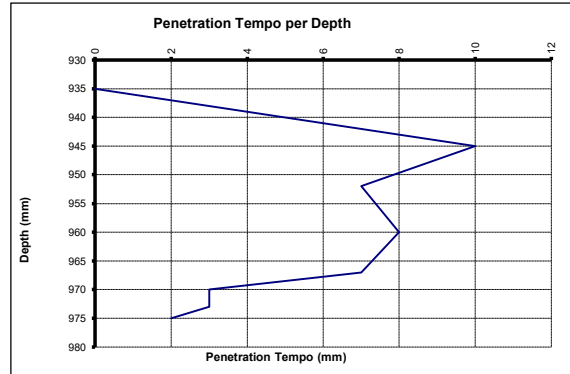
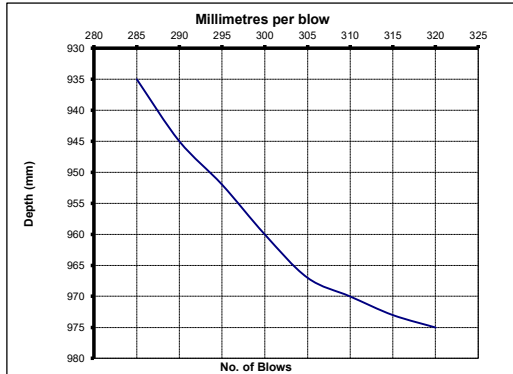
STARTING DEPTH: 935mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @975mm



Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 7	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @752mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	20	0mm	0	0					
5	52	32mm	32	6.4	Dense	145	39	41	383
10	78	58mm	26	5.2	Dense	169	51	53	481
15	104	84mm	26	5.2	Dense	169	51	53	481
20	128	108mm	24	4.8	Very Dense	179	56	59	525
25	152	132mm	24	4.8	Very Dense	179	56	59	525
30	175	155mm	23	4.6	Very Dense	184	59	62	550
35	200	180mm	25	5.0	Very Dense	173	53	56	502
40	231	211mm	31	6.2	Dense	148	40	42	397
45	255	235mm	24	4.8	Very Dense	179	56	59	525
50	279	259mm	24	4.8	Very Dense	179	56	59	525
55	302	282mm	23	4.6	Very Dense	184	59	62	550
60	325	305mm	23	4.6	Very Dense	184	59	62	550
65	355	335mm	30	6.0	Dense	152	42	44	411
70	386	366mm	31	6.2	Dense	148	40	42	397
75	421	401mm	35	7.0	Dense	136	35	36	348
80	456	436mm	35	7.0	Dense	136	35	36	348
85	485	465mm	29	5.8	Dense	156	44	46	427
90	518	498mm	33	6.6	Dense	142	37	39	371
95	538	518mm	20	4.0	Very Dense	200	70	75	640
100	564	544mm	26	5.2	Dense	169	51	53	481
105	590	570mm	26	5.2	Dense	169	51	53	481
110	612	592mm	22	4.4	Very Dense	190	62	66	577
115	630	610mm	18	3.6	Very Dense	>200	81	86	718
120	643	623mm	13	2.6	Very Dense	>200	122	>110	1023
125	652	632mm	9	1.8	Very Dense	>200	185	>110	1528
130	658	638mm	6	1.2	Very Dense	>200	263	>110	2377
135	665	645mm	7	1.4	Very Dense	>200	232	>110	2010
140	670	650mm	5	1.0	Very Dense	>200	300	>110	2900
145	676	656mm	6	1.2	Very Dense	>200	263	>110	2377
150	679	659mm	3	0.6	Very Dense	>200	389	>110	5061
155	682	662mm	3	0.6	Very Dense	>200	389	>110	5061
160	685	665mm	3	0.6	Very Dense	>200	389	>110	5061
165	687	667mm	2	0.4	Very Dense	>200	442	>110	7873
170	692	672mm	5	1.0	Very Dense	>200	300	>110	2900
175	695	675mm	3	0.6	Very Dense	>200	389	>110	5061
180	699	679mm	4	0.8	Very Dense	>200	342	>110	3699
185	700	680mm	1	0.2	Very Dense	>200	500	>110	16760
190	702	682mm	2	0.4	Very Dense	>200	442	>110	7873
195	704	684mm	2	0.4	Very Dense	>200	442	>110	7873
200	705	685mm	1	0.2	Very Dense	>200	500	>110	16760
205	707	687mm	2	0.4	Very Dense	>200	442	>110	7873
210	709	689mm	2	0.4	Very Dense	>200	442	>110	7873
215	710	690mm	1	0.2	Very Dense	>200	500	>110	16760
220	772	752mm	62	12.4	Dense	89	17	17	186

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 7

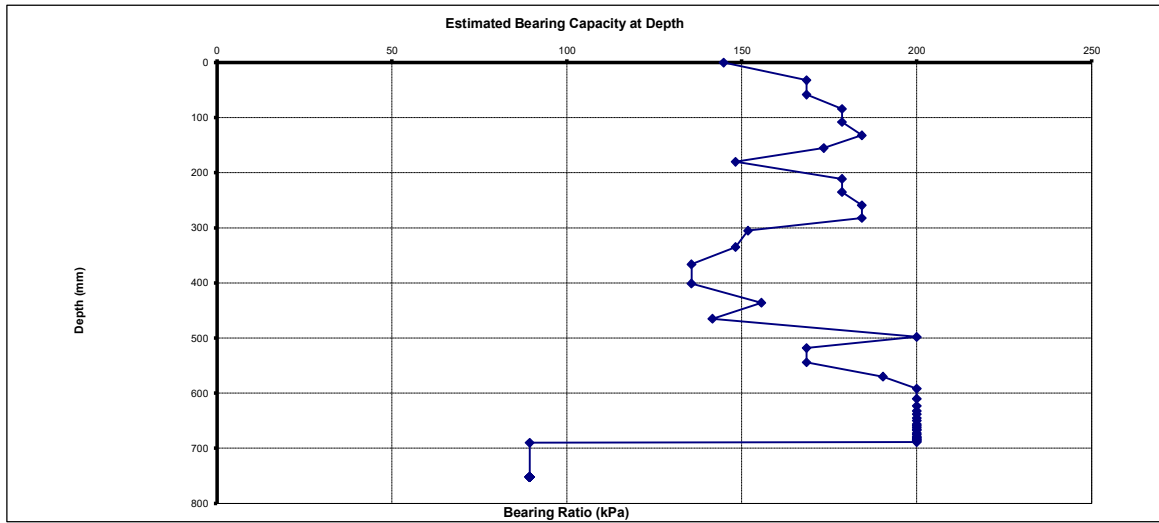
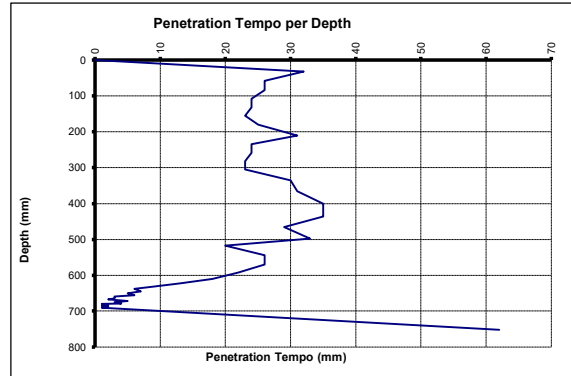
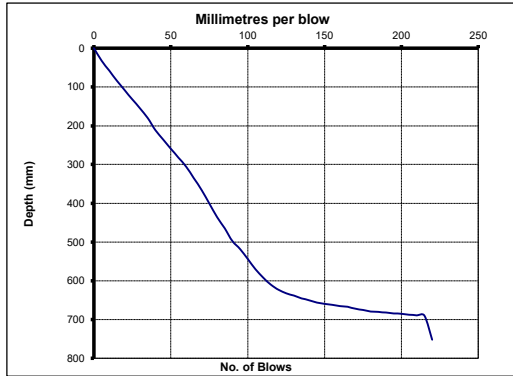
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @752mm



Req No:

Order No:

Estimate Bearing Ratio calculations based on a paper by Dr. Barry van Wyk

CLIENT:	Makone Consulting Engineers	DATE:	19/08/2019
TEST REPORT:	Geotechnical Investigation International Softball Stadium in Polokwane (new)	JOB NUMBER:	91594
OPERATOR:	Rabelani	DATE TESTED:	19/08/2019
TEST POSITION:	DCP 8	STARTING DEPTH:	0mm
MATERIAL TYPE:	Gravel	INSTRUMENT USED:	1m DCP
CONSTRUCTION TYPE:	Structural	NOTE:	Refused @1010mm

Number of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	Structure Nr (dn) mm/blow	Consistency	Estimate Bearing Ratio (kPa)	In Situ CBR 410x (dn) ^{-1.27}	In Situ CBR (TMH 6)	In Situ UCS 2900x (dn) ^{-1.09}
0	15	0mm	0	0					
5	40	25mm	25	5.0	Very Dense	173	53	56	502
10	51	36mm	11	2.2	Very Dense	>200	151	>110	1228
15	60	45mm	9	1.8	Very Dense	>200	185	>110	1528
20	65	50mm	5	1.0	Very Dense	>200	300	>110	2900
25	76	61mm	11	2.2	Very Dense	>200	151	>110	1228
30	85	70mm	9	1.8	Very Dense	>200	185	>110	1528
35	95	80mm	10	2.0	Very Dense	>200	170	>110	1362
40	106	91mm	11	2.2	Very Dense	>200	151	>110	1228
45	118	103mm	12	2.4	Very Dense	>200	135	>110	1117
50	138	123mm	20	4.0	Very Dense	200	70	75	640
55	160	145mm	22	4.4	Very Dense	190	62	66	577
60	195	180mm	35	7.0	Dense	136	35	36	348
65	248	233mm	53	10.6	Dense	100	20	21	221
70	312	297mm	64	12.8	Medium Dense	87	16	17	180
75	368	353mm	56	11.2	Dense	96	19	20	208
80	429	414mm	61	12.2	Dense	90	17	18	190
85	453	438mm	24	4.8	Very Dense	179	56	59	525
90	578	563mm	125	25.0	Medium Dense	54	7	7	87
95	648	633mm	70	14.0	Medium Dense	82	14	15	163
100	715	700mm	67	13.4	Medium Dense	84	15	16	171
105	781	766mm	66	13.2	Medium Dense	85	15	16	174
110	850	835mm	69	13.8	Medium Dense	83	15	15	166
115	918	903mm	68	13.6	Medium Dense	84	15	15	169
120	984	969mm	66	13.2	Medium Dense	85	15	16	174
125	1025	1010mm	41	8.2	Dense	121	28	30	293

DCP GRAPHICAL REPRESENTATION

PROJECT: Geotechnical Investigation International Softball Sta

DATE TESTED: 19/08/2019

CLIENT: Makone Consulting Eng

OPERATOR: Rabelani

TEST POSITION: DCP 8

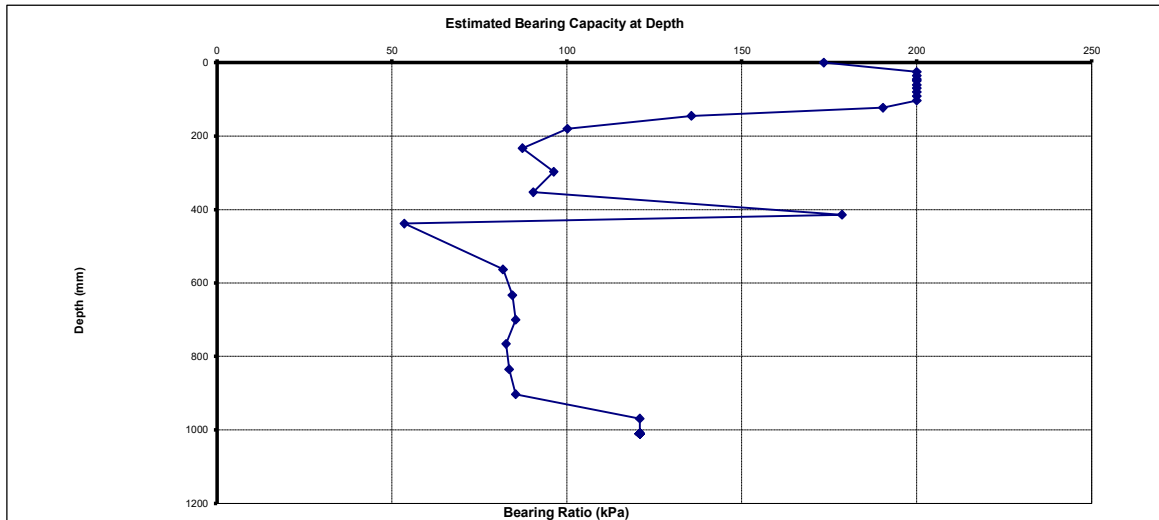
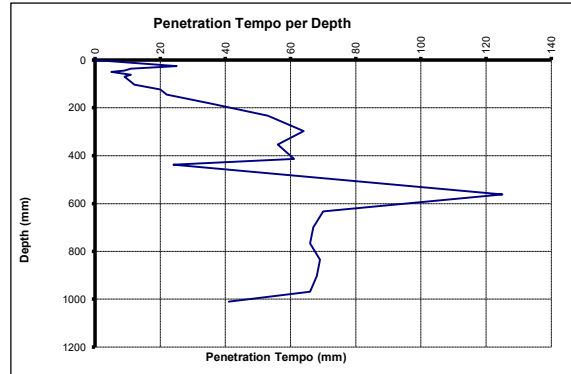
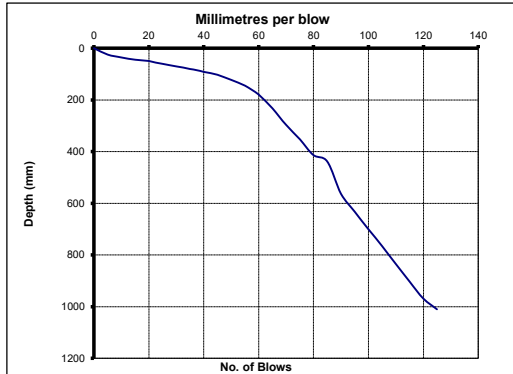
STARTING DEPTH: 0mm

MATERIAL TYPE: Gravel

INSTRUMENT USED: 1m DCP

CONSTRUCTION TYPE: Structural

NOTE: Refused @1010mm



Clients Marking:	None	Date Sampled:	2019/08/24
Sample Number:	S/4239-S/4246		
Sample delivered to:	Roadlab	Date Received:	2019/08/24

Remarks :

Z:\10. Site Investigation\2019\Projects\91594-Makone Consulting Engineers - Geotechnical Investigation for softball Statduim in Polokwane (new Site) (RGI 0459)\Results\PH & Conductivity (New).