



VHEMBE DISTRICT MUNICIPALITY

TENDER DOCUMENT

REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION

A TENDER FOR CATEGORY 6ME OR HIGHER CIDB REGISTERED

CONTRACTORS

BID No. VDM/TECH/17/03/2026/03

CLOSING DATE: 21 APRIL 2026 AT 12H00

ISSUED BY:	PREPARED BY:
Vhembe District Municipality Private Bag X5006 Thohoyandou 0950 Contact Person: Mr W Maluleke General Manager: Technical Services Telephone: 015 960 2000	HWA Engineers & Project Managers P.O Box 3472 Polokwane 0700 Tel: 015 297 5906 Email: admin@hwaeng.co.za

NAME OF TENDERER:

AMOUNT OF TENDER (VAT INCLUSIVE):

CIDB GRADE:



EXPANDED PUBLIC WORKS PROGRAMME
Creating opportunities towards human fulfilment

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MBD 1**INVITATION TO BID**

YOU ARE HEREBY INVITED TO BID FOR THE REQUIREMENTS OF THE VHEMBE DISTRICT MUNICIPALITY

BID NUMBER: VDM/TECH/17/03/2026/03 CLOSING DATE: 21 APRIL 2026 CLOSING TIME:12H00

DESCRIPTION: REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION

The successful bidder will be required to fill in and sign a written Contract Form (MBD 7).

BID DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT:

THE BID BOX , NEXT TO THE ENTRANCE OF VHEMBE DISTRICT MUNICIPALITY OFFICES, NEXT TO KHORONI HOTEL (FORMER VENDA TUSK HOTEL)

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

The bid box is generally open from 08h00 to 16h30, 7 days a week.

ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS - (NOT TO BE RE-TYPED)

THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2011, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT

NB: NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE (as defined in Regulation 1 of the Local Government: Municipal Supply Chain Management Regulations)

**THE FOLLOWING PARTICULARS MUST BE FURNISHED
(FAILURE TO DO SO MAY RESULT IN YOUR BID BEING DISQUALIFIED)**

NAME OF BIDDER.....

POSTAL ADDRESS.....

STREET ADDRESS.....

TELEPHONE NUMBER CODE.....NUMBER.....

CELLPHONE NUMBER.....

FACSIMILE NUMBER CODE NUMBER.....

E-MAIL ADDRESS.....

VAT REGISTRATION NUMBER.....

HAS AN ORIGINAL AND VALID TAX CLEARANCE CERTIFICATE BEEN ATTACHED? (MBD 2) YES/NO

HAS A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE BEEN SUBMITTED? (MBD 6.1) YES/NO

IF YES, WHO WAS THE CERTIFICATE ISSUED BY?

AN ACCOUNTING OFFICER AS CONTEMPLATED IN THE CLOSE CORPORATION ACT (CCA) ☐A VERIFICATION AGENCY ACCREDITED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM (SANAS) ☐A REGISTERED AUDITOR ☐

(Tick applicable box)

(A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE)

1) ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS/SERVICES/WORKS OFFERED?
YES/NO

(IF YES ENCLOSE PROOF)

SIGNATURE OF BIDDER

DATE.....

CAPACITY UNDER WHICH THIS BID IS

SIGNED.....

TOTAL BID PRICE.....

TOTAL NUMBER OF ITEMS OFFERED.....

ANY ENQUIRIES REGARDING THE BIDDING PROCEDURE MAY BE DIRECTED TO:

Municipality / Municipal Entity: Vhembe District Municipality**Department:** Supply Chain Management Office**Tel:** 015 960 2093/2107/2129/2163

ANY ENQUIRIES REGARDING TECHNICAL INFORMATION MAY BE DIRECTED TO:**Municipality / Municipal Entity:** Vhembe District Municipality**Department:** General Manager Technical Services**Contact Person:** Mr Maluleke W**Tel:** 015 960 2000

Specifications and other conditions are detailed in the bid documents. Bid documents are obtainable at the Vhembe District Municipality Office, Next to Khoroni Hotel (Former Venda Tusk Hotel), Thohoyandou during office hours (08h00-16h30). The Tenderer must submit the tender with the following to form part of the contract if awarded.

- 4 A Non-Refundable fee of R 2077.00 should be paid at the Vhembe District Municipality bank account per document. Proof of payment should be produced upon collection. Cash will be accepted at the office. Alternatively, the document can be freely downloaded on the Vhembe District Municipality Website and National Treasury Etender.**
- 5 All bid documents must be sealed in a cover clearly marked and must be deposited in the bid box next to the entrance of Vhembe District Municipality Offices, Next to Khoroni Hotel (Former Venda Tusk Hotel) in Thohoyandou.**
- 6 Vhembe District Municipality does not bind itself to accept the lowest or any bid and reserves the right to accept the whole or part of a bid. Bids will be evaluated and adjudicated in line with Vhembe District Municipality's Procurement Policy, Preferential Procurement Policy Framework Act of 2011 in consultation to the CIDB Act. Bidders will be evaluated on Responsiveness of bids, and only bidders who meet the responsiveness requirement on will be evaluated on Price and B-BBEE Status as outlined in the bid document.
- 7 NO LATE / TELEPHONIC / FAXED OR EMAILED BIDS WILL BE ACCEPTED**

Enquiries relating to bid documents should be directed to Vhembe District Municipality Supply Chain Management Office at 015 960 2032.

KUTAMA ZN
MUNICIPAL MANAGER

VHEMBE DISTRICT MUNICIPALITY**REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS
AND PUMP STATION****VDM/TECH/17/03/2026/03****T1.2 Site Inspection Certificate**

This is to certify that I,

.....

representing and duly authorized by (Tenderer)

.....

attended the site inspection on

.....

Having prior to this site visit carefully examined the tender document, technical information and drawings supplied, I confirm that I was given unrestricted access to inspect those sections of the Site necessary for the execution of the Works.

I further confirm that I am completely satisfied with the scope of work as explained by the Engineer, and am fully aware of all Site conditions and regulations of whatsoever nature that could influence the preparation of our tender.

I therefore append my signature below in agreement that we will not institute any claim against the Employer after submission of our tender based on lack of knowledge of site conditions or regulations pertaining to the execution of this Contract.

Signature of Representative of the Engineer

Date.....

Signature of Representative of the Contractor

Date.....

VHEMBE DISTRICT MUNICIPALITY

REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION

VDM/TECH/17/03/2026/03

T1.3 Tender Data

The conditions of Tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Construction Procurement. (See www.cidb.org.za) which are reproduced without amendment or alteration for the convenience of Tenderers as an Annex to this Tender Data.

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this Tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the standard conditions of Tender. Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies.

The additional conditions of Tender are:

Clause number	Tender Data
C.1.1	The employer is Vhembe District Municipality.
C.1.2	The Tender document consists of the following: <u>TENDER</u> T1: Tendering Procedures T1.1 Tender notice and invitation to Tender T1.2 Site inspection T1.3 Tender data T2 : Returnable Documents T2.1 List of returnable documents T2.2 Returnable schedules <u>CONTRACT</u> Part 1: Agreements and contract data C1.1 Form of offer and acceptance C1.2 Contract data C1.3 Performance Guarantee C1.4 Disclosure Statement C1.5 Adjudication Board Member Agreement Part 2: Pricing data C2.1 Pricing instructions C2.2 Preamble Schedule of Quantities Part 3: Scope of work

	C3 Scope of work Part 4: Site information C4.1 Site information C4.2 Tender Drawings
C.1.4	The employer's agent is: Name: HWA Engineers and Project Managers Address: Physical Address: Postal Address: 127 Marshall Street P.O. Box 3472 Polokwane Polokwane 0700 0700 Tel: (015) 297 5906 E-mail: admin@hwaeng.co.za
C.1.5	The Employer's right to accept or reject any tender off. The employer is not obliged to accept the lowest or any tender offer.
C.2.1	Only those Tenderers who have in their employ management and supervisory staff satisfying the requirements of the Scope of Work for labour intensive competencies for supervisory and management staff are eligible to submit Tenders.
C.2.2	The following Tenderers who are registered with the CIDB, or are capable of being so registered prior to the evaluation of submissions, are eligible to submit Tenders: a) contractors who have a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum Tendered for a 6ME class of construction work; and b) contractors registered as potentially emerging enterprises with the CIDB who are registered in one contractor grading designation lower than that required in terms of a) above and who satisfy the following criteria: i) The Department, following an interview with the management of the enterprise, is satisfied that the enterprise has the potential to develop and qualify to be registered in a higher contractor grading designation; and ii) The Department, following a risk assessment, is able to provide the necessary supportive measures required to enable the enterprise to successfully execute the contract. Joint ventures are eligible to submit Tenders provided that: - every member of the joint venture is registered with the CIDB; - the lead partner has a contractor grading designation in the 6ME or higher class of construction work; and - the combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a 6ME or higher class of construction work.
C.2.7	The arrangements for a compulsory clarification meeting are as stated in the Tender Notice and Invitation to Tender. Tenderers must sign the attendance list in the name of the Tendering entity. Addenda will be issued to and Tenders will be received only from those Tendering entities appearing on the attendance list.

C.2.12	No alternative Tender offers will be considered If a Tenderer wishes to submit an alternative Tender offer, the only criteria permitted for such alternative Tender offer is that it demonstrably satisfies the Employer's standards and requirements, the details of which may be obtained from the Employer's Agent. Calculations, drawings and all other pertinent technical information and characteristics as well as modified or proposed Pricing Data must be submitted with the alternative Tender offer to enable the Employer to evaluate the efficacy of the alternative and its principal elements, to take a view on the degree to which the alternative complies with the Employer's standards and requirements and to evaluate the acceptability of the pricing proposals. Calculations must be set out in a clear and logical sequence and must clearly reflect all design assumptions. Pricing Data must reflect all assumptions in the development of the pricing proposal. Acceptance of an alternative Tender offer will mean acceptance in principle of the offer. It will be an obligation of the contract for the Tenderer, in the event that the alternative is accepted, to accept full responsibility and liability that the alternative offer complies in all respects with the Employer's standards and requirements. The modified Pricing Data must include an amount equal to 5% of the amount Tendered for the alternative offer to cover the Employer's costs of confirming the acceptability of the detailed design before it is constructed.
C.2.13.3	Parts of each Tender offer communicated on paper shall be submitted as original only.
C.2.13.5 C2.15.1	The employer's address for delivery of Tender offers and identification details to be shown on each Tender offer package are: Location of Tender box: Vhembe District Municipality Offices Next To Khoroni Hotel (Former Venda Tusk Hotel) In Thohoyandou Identification Details: Refurbishment of Harper Wastewater Treatment Works and Pump Station Postal address: Private Bag X 5006, Thohoyandou, 0950
C.2.13	A one-envelope procedure will be followed.
C.2.15	The closing time for submission of Tender offers is as stated in the Tender Notice and Invitation to Tender.
C.2.15	Telephonic, telegraphic, telex, facsimile or e-mailed Tender offers will not be accepted.
C.2.16	The Tender offer validity period is 90 days
C.2.18	The Tenderer shall, when requested by the Employer to do so, submit the names of all management and supervisory staff that will be employed to supervise the labour-intensive portion of the works together with satisfactory evidence that such staff members satisfy the eligibility requirements.
C.2.19	Access shall be provided for inspections, tests and analysis by personnel acting on behalf of the Employer.
C.2.23	The Tenderer is required to submit with his Tender the following documents which shall form part of the contract if awarded: • CIDB grade 6ME or higher must be submitted. • Original valid Tax Clearance Certificate issued by the South African Revenue Services.

	• Certified company registration • Municipal rates and taxes • Attended the compulsory site meeting • Authority to signatory • Signing of form of offer • Alterations signed, document completed in full and initial every page • Document submitted in original format (Not dismantled) • Only South African currency must be used in all the rates. • Workmen's compensation Registration Certificate (or proof of payment of contributions in terms of the Compensation for Occupational Injuries and Disease Act No.130 of 1993. • All certified copies must not be older than 3 months
C.3.4	Tenders will be opened immediately after the closing time for Tenders at Municipal Offices, Vhembe District Municipality Offices.
C.3.11	The procedure for the evaluation of responsive Tenders is Method 2 (CIDB -BEST PRACTICE GUIDELINE #A3 Evaluating tenders offers, February 2008, Fifth edition of CIDB document 1003) The financial offer will be scored using Formula 2 (option 1) where the value of W_1 is: 1) 90 where the financial value inclusive of VAT of all responsive Tenders received have a value in excess of R 50 000 000; or 2) 80 where the financial value inclusive of VAT of one or more responsive Tender offers equals or is less than R 50 000 000. Up to 100 minus W_1 Tender evaluation points will be awarded to Tenderers who complete the preferencing schedule and who are found to be eligible for the preference claimed.

C.3.11.1

The following tender evaluation method shall be used

Method 1: Financial offer	1) Rank tender offers from the most favorable to the least favorable comparative offer. 2) Recommend highest ranked tenderer for the award of the contract,
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
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
Method 4: Financial offer, quality and preferences	2) Score quality, rejecting all tender offers that fail to score the minimum number of points for quality stated in the Tender data. 3) Score tender evaluation points for financial offer. 4) Confirm that tenderers are eligible for the preferences claimed, and if so, score tender evaluation points for preferencing. 5) Calculate total tender evaluation points. 6) Rank tender offers from the highest number of tender evaluation points to the lowest. 7) Recommend tenderer with the highest number of tender

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 Bid offers using the following formula:

$N_{FO} = W_1 \times A$ where:

N_{FO} = the number of Bid evaluation points awarded for the financial offer.

W_1 = the maximum possible number of Bid evaluation points awarded for the financial offer as stated in the Bid Data.

A = a number calculated using either formulas 1 or 2 below as stated in the Bid Data.

Formula	Basis for comparison	Option 1	Option 2
1	Highest price or discount	$(1 + \frac{(P - P_m)}{P_m})$	P/P_m
2	Lowest price or percentage commission/fee	$(1 - \frac{(P - P_m)}{P_m})$	P_m/P

where:

P_m = the comparative offer of the most favorable Bid offer.

P = the comparative offer of Bid offer under consideration.

C3.13.1	Tender offers will only be accepted if: (a) the Tenderer has in his or her possession an original valid Tax Clearance Certificate issued by the South African Revenue Services or has made arrangements to meet outstanding tax obligations; (b) the Tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation; (c) the Tenderer or any of its directors 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; (d) the Tenderer has not: i) abused the Employer's Supply Chain Management System; or ii) failed to perform on any previous contract and has been given a written notice to this effect; and e) Tenderer has completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the Tenderer's ability to perform the contract in the best interests of the employer or potentially compromise the Tender process. f) the Tenderer does not have arrears on municipal rates and levies exceeding 3 months. g) the tender offer is signed by a person authorized to sign on behalf of the Tenderer h) Tenderers declaration of compliance with the Occupational Health and Safety Act No. 85 of 1993 and the Construction Regulations 2014 as well as the tenderer's health and safety plan, is included with his tender submission. i) a tenderer who submitted a tender as a Joint Venture has included an acceptable Joint Venture Agreement with his tender j) the Employer is satisfied that the Tenderer or any of his principals have <u>not influenced</u> the tender offer and acceptance by the following criteria: a) having offered, promised or given a bribe or other gift or remuneration to any person in connection with the obtaining or execution of this Contract; b) having acted in a fraudulent or corrupt manner in obtaining or executing this Contract; c) having approached an officer or employee of the Employer or the Employer's Agent with the objective of influencing the award of a Contract in the tenderers favour d) having entered into any agreement or arrangement, whether legally binding or not, with any other person, firm or company to refrain from Tendering for this Contract or as to the amount of the Tender to be submitted by either party e) having disclosed to any other person, firm or company other than the Employer, the exact or approximate amount of his proposed Tender: f) The Employer may, in addition to using any other legal remedies, repudiate the Tender offer and acceptance and declare the Contract invalid should it have been concluded already
C.3.18	The number of paper copies of the signed contract to be provided by the employer is one.

Evaluation Criteria

1. Company's Experience & References

No.	Target goals Name reference with contact details (Projects involving Waste Water Treatment and Booster Pump Station works. Each project must have a minimum value of R 3,000,000.00 and be completed within 5 (Five) years. Attach the signed appointment letter and the signed completion certificate	Weighting	Score
1.		10	
2.		10	
3.		10	
4.		10	
5.		10	
	SUBTOTAL: Experience & References	50	

Note: Please attach appointment letters and signed completion certificates issued by the client as proof for having such a project. Completion certificate should be signed by the client. For subcontracted works, Appointment letter and completion certificate of the main contractor should be attached with the bidder's appointment letter and completion certificate.

2. Representative experience

No.	Target goal (attach CV & certified copy of qualifications)	Weighting	Score
1.	Contract Manager in Wastewater Treatment Works and Wastewater booster pump station 4 years and above = 4 points 3 years = 3 points 2 years = 2 points 1 year = 1 point	4	
2.	Site Agent in Wastewater Treatment Works and Wastewater Booster Pump Station 3 years and above = 3 points 2 years = 2 points 1 year = 1 point	3	
3.	Foreman in Wastewater Treatment Works and Wastewater Booster Pump Station. 2 years and above = 2 points 1 year = 1 point	2	
4.	Health and Safety Officer years of experience as OHS in Wastewater Treatment Works and Wastewater Booster Pump Station 2 years and above = 1 points	1	
	SUBTOTAL: Representative experience	10	

3. Representative Qualification

No.	Target goals	Weighting	Score
1.	Contract Manager BSc/B Tech=5 National Diploma Civil or Mechanical = 4	5	
2.	Site Agent National Diploma Civil or Mechanical and higher= 3 points N6 Certificate=2	3	
3	Foreman		

	N2 Electrical Certificate=3 points	3	
4	Health National Diploma = 2 points Certificate = 1 points	2	
	SUBTOTAL: Representative Qualification	13	

Note: *Project Organogram of the project team should be attached. Curriculum vitae with certified copies of qualifications should be attached to the tender document for verification by client. International qualification should be accompanied by SAQA certificate*

4. Financial Reference

No.	Target goals	Weighting	Score
1.	Tenderer submitted bank details proof attached	1	
2.	Bank rating "C" or better	4	
3.	Registered financial institution's full details as guarantor in the amount of 10% as specification for surety purposes shall be submitted. Valid NCR certificate of the guarantor should be attached.	2	
	SUBTOTAL: Financial references	7	

5. Plants & Equipment

No.	Target goals	Weighting	Score
1.	Bakkie	5	
2.	Crane Truck	5	
3.	Honey Sucker	5	
4.	Dropside truck 4 ton	5	
	SUBTOTAL: Plant & equipment	20	

Note: Signed letter and proof of ownership to be submitted with tender document. If the plant is hired, an intent letter from plant Hire Company should be attached..

6. Summary of table 1-5

No.	Summary of tables	Weighting	Score
1.	Experience & References	50	
2.	Representative Experience	10	
3.	Representative Qualifications	13	
4.	Financial references	07	
5.	Plants and Equipment's	20	
	Sub-Total	100	
	PRICE	80	
	SPECIFIC GOALS	20	

NB: Functionality will be scored out of 100 and Bidders who do not reach the 75% threshold will not be evaluated further.

GRADING = 6ME

Standard Conditions of Tender

General

C.1.1 Actions

C.1.1.1 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 C.2 and C.3, timeously and with integrity, and behave equitably, honestly and transparently. Comply with all legal obligations and not engage in anticompetitive practices.

C.1.1.2 The employer and the tenderer and all their agents and employees involved in the tender process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such conflict of interest, indicating the nature of such conflict. Tenderers shall declare any potential conflict of interest in their tender submissions. Employees, agents and advisors of the employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

Note: 1) A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his or her position even if no improper acts result.

2) Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decisions taken.

C.1.1.3 The employer shall not seek and a tenderer shall not submit a tender without having a firm intention and the capacity to proceed with the contract.

C.1.2 Tender Documents

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

C.1.3 Interpretation

C.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.

C.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.

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

a) **conflict of interest** means any situation in which:

- ii) someone in a position of trust has competing professional or personal interests which make it difficult to fulfill his or her duties impartially;
 - iii) an individual or tenderer is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or
 - iv) incompatibility or contradictory interests exist between an employee and the tenderer who employs that employee.
- b) **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.

C.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.

C.1.5 Cancellation and Re-Invitation of Tenders

C.1.5.1 An employer may, prior to the award of the tender, cancel a tender if-

- a) due to changed circumstances, there is no longer a need for the engineering and construction works specified in the invitation;
- b) funds are no longer available to cover the total envisaged expenditure; or
- c) no acceptable tenders are received.
- d) there is a material irregularity in the tender process.

C.1.5.2 The decision to cancel a tender invitation must be published in the same manner in which the original tender invitation was advertised.

C.1.5.3 An employer may only with the prior approval of the relevant treasury cancel a tender invitation for the second time.

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

C.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.

C.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.

C.2 Tenderer's obligations

C.2.1 Eligibility

C.2.1.1 Submit a Tender offer only if the Tenderer complies with 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.

C.2.1.2 Notify the employer of any proposed material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used by the employer as the basis in a prior process to invite the tenderer to submit a tender offer and obtain the employer's written approval to do so prior to the closing time for tenders.

C.2.2 Cost of Tendering

C.2.2.1 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.

C.2.2.2 The cost of the tender documents charged by the employer shall be limited to the actual cost incurred by the employer for printing the documents. Employers must attempt to make available the tender documents on its website so as not to incur any costs pertaining to the printing of the tender documents.

C.2.3 Check documents

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

C.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.

C.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.

C.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.

C.2.7 Clarification meeting

Attend **a compulsory 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.

C.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.

C.2.9 Insurance

Be aware that the extent of insurance to be provided by the employer (if any) may 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.

C.2.10 Pricing the Tender offer

C.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.

C.2.10.2 Show VAT payable by the employer separately as an addition to the Tendered total of the prices.

C.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.

C.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.

C.2.11 Alterations to documents

Not to 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.

C.2.12 Alternative Tender offers

C.2.12.1 Unless otherwise stated in the tender data Submit alternative Tender offers only if a main Tender offer, strictly in accordance with all the requirements of the Tender documents, 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 documents with the alternative requirements the Tenderer proposes.

C.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.

C.2.12.3 An alternative tender offer must only be considered if the main tender offer is the winning tender.

C.2.13 Submitting a Tender offer

C.2.13.1 Submit one tender offer only, either as a single tendering entity or as a member in a joint venture to provide the whole of the works identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

C.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.

C.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.

C.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.

C.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.

C.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.

C.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.

C.2.13.8 Accept that the employer shall 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.

C.2.13.9 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.

C.2.13.10 Accept that tender offers submitted by facsimile or e-mail will be rejected by the employer, unless stated otherwise in the tender data.

C.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.

C.2.15 Closing time

C.2.15.1 Ensure that the employer receives the Tender offer at the address specified in the Tender data not later than **12H00 on 21 April 2026** as 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.

C.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.

C.2.16 Tender offer validity

C.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.

C.2.16.2 If requested by the employer, consider extending the validity period stated in the Tender data for an agreed additional period with or without any conditions attached to such extension.

C.2.16.3 Accept that a tender submission that has been submitted to the employer may only be withdrawn or substituted by giving the employer's agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted. If the validity period stated in C.2.16 lapses before the employer evaluating tender, the contractor reserves the right to review the price based on Consumer Price Index (CPI).

C.2.16.4 Where a tender submission is to be substituted, a tenderer must submit a substitute tender in accordance with the requirements of C.2.13 with the packages clearly marked as "SUBSTITUTE".

C.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 C.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.

C.2.18 Provide other material

C.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), referencing 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.

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

C.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.

C.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.

C.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.

C.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.

C.2.23 Certificates

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

C.3 The employer's undertakings**C.3.1 Respond to clarification**

C.3.1.1 Respond to a request for clarification received up to five working days prior to the Tender closing time stated in the Tender Data and notify all Tenderers who drew procurement documents.

C.3.1.2 Consider any request to make a material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used to prequalify a tenderer to submit a tender offer in terms of a previous procurement process and deny any such request if as a consequence:

- a) an individual firm, or a joint venture as a whole, or any individual member of the joint venture fails to meet any of the collective or individual qualifying requirements;
- b) the new partners to a joint venture were not prequalified in the first instance, either as individual firms or as another joint venture; or

c) in the opinion of the Employer, acceptance of the material change would compromise the outcome of the prequalification process.

C.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 of the Tender Notice 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, will then notify it to all Tenderers who drew documents.

C.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.

C.3.4 Opening of Tender submissions

C.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.

C.3.4.2 Announce at the opening 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.

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

C.3.5 Two-envelope system

C.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.

C.3.5.2 Evaluate the functionality of the technical proposals offered by Tenderers, then advice 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 above 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 points claimed on BBBEE status

level. Return unopened financial proposals to Tenderers whose technical proposals failed to achieve the minimum number of points for functionality.

C.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.

C.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.

C.3.8 Test for responsiveness

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

- a) meets 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.

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) detrimentally 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.

C.3.9 Arithmetical errors, omissions and discrepancies

C.3.9.1 Check responsive Tender offers for arithmetical errors, correcting them in the following manner: Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.

C.3.9.2 Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with F.3.11 for:

- a) the gross misplacement of the decimal point in any unit rate;
- b) omissions made in completing the pricing schedule or bills of quantities; or
- c) arithmetic errors in:
 - i) line-item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or
 - ii) the summation of the prices.

C.3.9.3 Notify the tenderer of all errors or omissions that are identified in the tender offer and either confirm the tender offer as tendered or accept the corrected total of prices.

C.3.9.4 Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

- If a bill 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 will be corrected.
- 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 a bill of quantities applies) to achieve the Tendered total of the prices.

C.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.

C.3.11 Evaluation of Tender offers

The Standard Conditions of Tender standardize the procurement processes, methods and procedures from the time that tenders are invited to the time that a contract is awarded. They are generic in nature and are made project specific through choices that are made in developing the Tender Data associated with a specific project.

Conditions of tender are by definition the document that establishes a tenderer's obligations in submitting a tender and the employer's undertakings in soliciting and evaluating tender offers. Such conditions establish the rules from the time a tender is advertised to the time that a contract is awarded and require employers to conduct the process of offer and acceptance in terms of a set of standard procedures.

Requirement Qualitative interpretation of goal

Fair	The process of offer and acceptance is conducted impartially without bias, providing simultaneous and timely access to participating parties to the same information.
Equitable	Terms and conditions for performing the work do not unfairly prejudice the interests of the parties.
Transparent	The only grounds for not awarding a contract to a tenderer who satisfies all requirements are restrictions from doing business with the employer, lack of capability or capacity, legal impediments and conflicts of interest
Competitive	The system provides for appropriate levels of competition to ensure cost effective and best value outcomes.
Cost Effective	The processes, procedures and methods are standardized with sufficient flexibility to attain best value outcomes in respect of quality, timing and price, and least resources to effectively manage and control procurement processes.

The activities associated with evaluating tender offers are as follows:

- a) Open and record tender offers received
- b) Determine whether or not tender offers are complete
- c) Determine whether or not tender offers are responsive
- d) Evaluate tender offers
- e) Determine if there are any grounds for disqualification
- f) Determine acceptability of preferred tenderer
- g) Prepare a tender evaluation report
- h) Confirm the recommendation contained in the tender evaluation report

C3.11.1 General

The employer must appoint an evaluation panel of not less than three persons conversant with the proposed scope of works to evaluate each responsive tender offer using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

C.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.

C.3.13 Acceptance of Tender offer

C.3.13.1 Accept the tender offer; if in the opinion of the employer, it does not present any risk and only if the tenderer:

- a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement;
- b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract;
- c) has the legal capacity to enter into the contract;
- d) is not; insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act No. 2008, bankrupt or being wound up, has his/her affairs administered by a court or a judicial officer, has suspended his/her business activities or is subject to legal proceedings in respect of any of the foregoing;
- e) complies with the legal requirements, if any, stated in the tender data; and
- f) is able, in the opinion of the employer, to perform the contract free of conflicts of interest.

C.3.14 Prepare contract documents

C.3.14.1 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 and
- c) other revisions agreed between the employer and the successful tenderer.

C.3.14.2 Complete the schedule of deviations attached to the form of offer and acceptance, if any.

C.3.15 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.

C.3.16 Registration of the award

An employer must, within twenty-one (21) working days from the date on which a contractor's offer to perform a construction works contract is accepted in writing by the employer, register and publish the award on the CIDB Register of Projects.

C.3.17 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.

C.3.18 Provide written reasons for actions taken

Provide upon request written reasons to tenderers for any action that is taken in applying these conditions of tender but withhold information which is not in the public interest to be divulged, which is considered to prejudice the legitimate commercial interests of tenderers or might prejudice fair competition between tenderers.

VHEMBE DISTRICT MUNICIPALITY**REFURBISHMENT OF HARPER WASTEWATER TREATMENT
WORKS AND PUMP STATION****VDM/TECH/17/03/2026/03****T2.1 List of Returnable Documents**

The Tenderer must complete the following returnable documents for contract purposes:		<i>Tick if submitted</i>
1. Returnable Schedules required only for Tender evaluation purposes		
1.	Record of Addendum to Tender Document	_____
2.	Certificate for Authority for Signatory	_____
3.	Certificate of authority for joint ventures (where applicable)	_____
4.	Proposed Key Personnel	_____
5.	Financial References	_____
6.	Estimated Monthly Expenditure	_____
7.	Details of Alternative Tenders submitted	_____
8.	Amendments and qualifications by Tenderer	_____
9.	Schedule of Proposed sub-contractors	_____
10.	Schedule of Plant and Equipment	_____
11.	Schedule of Tenderer's Experience	_____
12.	Proposed amendments and qualifications	_____
13.	Compulsory Enterprise Questionnaire	_____
14.	Tax Clearance/Proof of CSD Registration	_____
15.	Declaration of interest	_____
16.	Declaration for procurement above R10 million (VAT included)	_____
17.	Preference Points claim form in terms of the preferential procurement regulations 2022	_____
18.	Declaration of Bidder's past supply chain management practices	_____
19.	Certificate of independent bid determination-MBD 9	_____
20.	Schedule of the Tenderer's Experience	_____
21.	Municipal statement on Tenderer's rates and taxes	_____
22.	CK and Certified ID Documents of Members	_____
2. Other documents required only for Tender evaluation purposes		
23.	Certificate of Contractor Registration issued by the Construction Industry Development Board or printout of the registration number	_____
24.	Valid Tax Clearance Certificate or Pin issued by the South African Revenue Services.	_____

25.	Company profile	_____
26.	Last 3 years audited financial statements for (Pty) Limited and more audited for	_____
27.	CV and qualification of key personnel	_____
28.	Qualification of the NQF qualified person and CV	_____
29.	Documentation if tender exceeds R10M (compulsory if applicable)	_____
	a) If the bidder is required by law to prepare AFS (Annual Financial Statements) for auditing, the AFS for the past three years or since the establishment if established during the past three years.	_____
30.	Municipal Rates of the company not in arrears for more than 90 days	_____
31.	Form of Offer properly signed	_____
32.	Letter of Good Standing (COIDA)	_____
33.	A certificate signed by the bidder certifying that the bidder has no undisputed commitments for municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days	_____
34.	Attach certificate of Attendance or Briefing Session Attendance Register signed	_____
35.	Required to Declare Interest	_____
36.	Certificate of Independent Bid Determination	_____
37.	Declaration of Bidder's Past Supply Chain Management Practices.	_____
38.	Certified copy of SPECIFIC GOALS Certificate.	_____
N.B All MBD forms must be included in the tender document.		_____
3 The offer portion of the C1.1 Offer and Acceptance		_____
4 C1.2 Contract Data (Part 2)		_____
5 C2.2 Bills of quantities		_____

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:

	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			

AUTHORITY FOR SIGNATORY

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

An example for a company is shown below:

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

Mr./Mrs.

has been duly authorized to sign all documents in connection with the Tender for Contract No

..... and any Contract which may arise there from on behalf of

(BLOCK CAPITALS)

.....

.....

SIGNED ON BEHALF OF THE COMPANY :

IN HIS CAPACITY AS :

DATE :

FULL NAMES OF SIGNATORY :

AS WITNESSES 1:

2:

Company Stamp

CERTIFICATE OF AUTHORITY FOR JOINT VENTURES

This Returnable Schedule is to be completed by joint ventures.

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

NAME OF FIRM	ADDRESS	DULY AUTHORISED SIGNATORY
Lead partner		Signature Name Designation.....
		Signature Name Designation.....
		Signature Name Designation.....
		Signature Name Designation.....

1.3 If the Tenderer is a PARTNERSHIP

- (a) Affix a copy of the relevant resolution on the Partners, duly signed and dated
- (b) List the Partners

.....

.....

.....

.....

.....

.....

1.4 If the Tenderer is a ONE-MAN-CONCERN.

Provided the full name, identity number and qualifications of the person

.....

1.5 If the Tenderer is a JOINT VENTURE

- (a) Affix a copy of the original document of information defining the conditions under which the joint venture will function, its period of duration and the participating persons, companies and/or firms
- (b) Affix a certificate signed for or on behalf of each participating person, company and/or firm authorizing the person who signed the tender to do so.

1.6 If the Tenderer is a CONCERN OTHER than these listed above

Provide full details of the CONCERN submitting the tender:

.....

The Tenderer shall list below the key personnel (including first nominee and the second-choice alternate), whom he/she proposes to employ on the contract should his tender be accepted, both at his headquarters and on the Site, to direct and for the execution of the work, together with their qualifications, experience, positions held and their nationalities.

DESIGNATION	NAME AND NATIONALITY OF: (i)NOMINEE (ii)ALTERNATE	SUMMARY OF QUALIFICATIONS, EXPERIENCE AND PRESENT OCCUPATION
<u>HEADQUARTERS</u>		
Partner/director		
Contracts manager		
Other key staff (give designation)		

Signed		Date	
Name		Position	
Tenderer			

[illegible]

FINANCIAL REFERENCES**FINANCIAL STATEMENTS**

I/We agree, if required, to furnish an audited copy of the latest set of financial statements together with my/our Directors' and Auditors' report for consideration by the Employer.

DETAILS OF COMPANY'S BANK

I/We hereby authorise the Employer/Engineer to approach all or any of the following banks for the purposes of obtaining a financial reference:

DESCRIPTION OF BANK DETAIL	BANK DETAILS APPLICABLE TO TENDERER'S HEAD OFFICE
Name of bank	
Branch name	
Branch code	
Street address	
Postal address	
Name of manager	
Telephone number	()
Fax number	()
Account number	

TENDERER'S TAX DETAILS

Tenderer's VAT vendor registration number:

Tenderer's SARS tax reference number:

Signed		Date	
Name		Position	
Tenderer			

ESTIMATED MONTHLY EXPENDITURE

The Tenderer shall state below the estimated value of work to be completed every month, based on his preliminary programme and his tendered unit rates.

MONTH	VALUE
1	R
2	R
3	R
4	R
5	R
6	R
7	R
8	R
9	R
10	R
11	R
12	R
13	R
14	R
15	R
16	R
17	R
18	R
19	R
20	R
21	R
22	R
23	R
24	R
25	R
26	R
27	R
	COMPLETION OF CONTRACT
TOTAL	R

Signed		Date	
Name		Position	
Tenderer			

DETAILS OF ALTERNATIVE TENDERS SUBMITTED

See condition of tender.

DESCRIPTION

Signed		Date	
Name		Position	
Tenderer			

AMENDMENTS AND QUALIFICATIONS BY TENDERER

See condition of tender

PAGE	DESCRIPTION

Signed		Date	
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.

	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			

SCHEDULE OF PLANT AND EQUIPMENT

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

(a) Details of major equipment that is owned by and immediately available for this contract.

Quantity	Description, size, capacity, etc.

Attach additional pages if more space is required.

(b) Details of major equipment that will be hired, or acquired for this contract if my/our Tender is acceptable.

Quantity	Description, size, capacity, etc.

Attach additional pages if more space is required.

Signed		Date	
Name		Position	
Tenderer			

SCHEDULE OF THE TENDERER'S EXPERIENCE

The following statement of similar work successfully executed by myself/ourselves:

Employer, contact person and telephone number	Description of contract	Value of work inclusive of VAT(Rand)	Date completed

Signed		Date	
Name		Position	
Tenderer			

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 C.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			

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) a member of any municipal council (b) a member of any provincial legislature (c) a member of the National Assembly or the • National Council of Province 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:

(d) a member of any municipal council (e) a member of any provincial legislature (f) a member of the National Assembly or the • National Council of Province 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:

- authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;
- 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;
- 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;
- 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
- 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			

TAX CLEARANCE REQUIREMENTS

IT IS A CONDITION OF BIDDING THAT -

- The taxes of the successful bidder must be in order, or that satisfactory arrangements have been made with the Receiver of Revenue to meet his / her tax obligations.
- 2. The attached form "Application for Tax Clearance Certificate (in respect of bidders)", must be completed in all respects and submitted to the Receiver of Revenue where the bidder is registered for tax purposes. The Receiver of Revenue will then furnish the bidder with a Tax Clearance Certificate that will be valid for a period of twelve (12) months from date of issue. This Tax Clearance Certificate must be submitted in the original together with the bid. Failure to submit the original and valid Tax Clearance Certificate may invalidate the bid.
- 3. In bids where Consortia / Joint Ventures / Sub-Contractors are involved each party must submit a separate Tax Clearance Certificate. Copies of the Application for Tax Clearance Certificates are available at any Receiver's Office.

MBD2/ Application for tax Certificate...

DECLARATION OF INTEREST

1. No bid 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 or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.
3. In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

3.1 Full Name of bidder or his or her representative:.....

3.2 Identity Number:

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

3.4 Company Registration Number:

3.5 Tax Reference Number:.....

3.6 VAT Registration Number:

3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.

3.8 Are you presently in the service of the state? YES / NO

3.8.1 If yes, furnish particulars.

.....
.....

¹MSCM Regulations: "in the service of the state" means to be –

6) a member of –

- (i) any municipal council;
- (ii) any provincial legislature; or
- (iii) the national Assembly or the national Council of provinces;
- (b) a member of the 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 the accounting authority of any national or provincial public entity; or
- (f) an employee of Parliament or a provincial legislature.

² Shareholder" means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.

3.9 Have you been in the service of the state for the past twelve months? YES / NO

3.9.1 If yes, furnish particulars

.....
.....

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

3.10.1 If yes, furnish particulars.

.....
.....

3.11 Are you, aware of any relationship (family, friend, other) between any other bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid? YES / NO

3.11.1 If yes, furnish particulars

.....
.....

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

3.12.1 If yes, furnish particulars.

.....
.....

3.13 Are any spouse, child or parent of the company's directors trustees, managers, principle shareholders or stakeholders in service of the state? YES / NO

3.13.1 If yes, furnish particulars.

.....
.....

3.14 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract. YES / NO

3.14.1 If yes, furnish particulars:

.....
.....

1. Full details of directors / trustees / members / shareholders.

Full Name	Identity Number	State Employee Number

.....
Signature

.....
Date

.....
Capacity

.....
Name of Bidder

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

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

1 Are you by law required to prepare annual financial statements for auditing? ***YES / NO**

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 bidder 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.

***YES / NO**

9.9. If yes, provide particulars.

.....

.....

.....

.....

* Delete if not applicable

10. 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**

5. If yes, furnish particulars

.....

.....

9. 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**

9.10. 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 Bidder

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 80/20 preference point system.

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

- a) Price; and
- b) Specific Goals.

1.4 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

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

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

1.6 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2. DEFINITIONS

- a) **“tender”** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
- b) **“price”** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- c) **“rand value”** means the total estimated value of a contract in Rand, calculated at the

- time of bid invitation, and includes all applicable taxes;
- d) **“tender for income-generating contracts”** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- e) **“the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

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

Where

- Ps = Points scored for price of tender under consideration
- Pt = Price of tender under consideration
- Pmin = Price of lowest acceptable tender

3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

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

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	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (80/20 system) (To be completed by the tenderer)
HDI (blacks, Indians and Colored)	12	
Woman-Ownership of more than 50%	2	
Disability ownership of more than 50%	2	
Youth	2	
Locality	2	
Total	20	

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:

- The information furnished is true and correct;
- The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- 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;
- 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:

.....

.....

.....

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

- This Municipal Bidding Document must form part of all bids invited.
- 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 taken to combat the abuse of the supply chain management system.
- The bid of any bidder may be rejected if that bidder, or any of its directors have:
 - abused the municipality's / municipal entity's supply chain management system or committed any improper conduct in relation to such system;
 - been convicted for fraud or corruption during the past five years;
 - willfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or
 - 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).
- **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

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

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

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM 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 Bidder

CERTIFICATE OF INDEPENDENT BID DETERMINATION

- 1 This Municipal Bidding Document (MBD) must form part of all bids¹ 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 bidding (or bid rigging).² Collusive bidding 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 bid of any bidder if that bidder 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 bidding process or the execution of the contract.
1. This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.
2. In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid:

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

² Bid rigging (or collusive bidding) 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 bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

(Bid Number and Description)

in response to the invitation for the bid 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 Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
 - (a) has been requested to submit a bid in response to this bid invitation;
 - (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
 - (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder
6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
 1. prices;
 2. geographical area where product or service will be rendered (market allocation)
 3. methods, factors or formulas used to calculate prices;
 4. the intention or decision to submit or not to submit, a bid;
 5. the submission of a bid which does not meet the specifications and conditions of the bid; or
 6. bidding with the intention not to win the bid.
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 bid invitation relates.

MBD 9

9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

.....

Signature

.....

Date

.....

Position

.....

Name of Bidder

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.

VHEMBE DISTRICT MUNICIPALITY
REFURBISHMENT OF HARPER WASTEWATER TREATMENT
WORKS AND PUMP STATION

VDM/TECH/17/03/2026/03

C1.1 Form of Offer and Acceptance

Offer

The employer, identified in the acceptance signature block, has solicited offers to enter into a contract in respect of the following works:

TENDER VDM/TECH/17/03/2026/03 – REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION

The Tenderer, identified in the Offer signature block below, 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 client reserves the right to appoint contractor on the full or reduced scope or to appoint several contractors.

THE OFFERED SUMMARY OF THE PRICES INCLUSIVE OF VALUE ADDED TAX IS:

.....
..... Rand (in words);
R (in figures).

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

For the Tenderer

Signature

Name

Capacity

(Name and
address of
organization)

.....

Name and
signature
of witness

Acceptance

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

The terms of the contract, are contained in:

Part C1: Agreements and Contract Data, (which includes this Agreement)

Part C2: Pricing Data

Part C3: Scope of Work.

Part C4: Site Information

and drawings and documents or parts thereof, which may be incorporated by reference into 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 must be duly signed by the authorised representative(s) of both parties.

The Tenderer shall within two weeks after receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the Contract Data, or just after, the date this Agreement comes into effect. Failure to fulfill any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

Notwithstanding anything contained herein, this Agreement comes into effect on the date when the Tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any). Unless the Tenderer (now Contractor) within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this Agreement, this Agreement shall constitute a binding contract between the parties.

For the Employer

Signature

Name

Capacity

Name and Organisation:

.....

.....

.....

Signature and name of Witness:

Signature

Name

Date

Schedule of Deviations**Notes:**

1. The extent of deviations from the tender documents issued by the Employer prior to the closing date is limited to those permitted in terms of the Conditions of Tender,
2. 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 becomes the subject of agreements reached during the process of, offer and acceptance, the outcome of such agreement shall be recorded here,
3. 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,
4. Any change or addition to the tender documents arising from the above agreements and recorded here, shall also be incorporated into the final draft of the Contract,

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

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

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

For the Tenderer:

..... Signature
..... Name
..... Capacity

For the Employer:

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

Name and address of organization:

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

Name and address of organization

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

..... Witness Signature

..... Witness Name

..... Date

Confirmation of Receipt

The tenderer, (now Contractor), identified in the Offer part of this Agreement hereby confirm receipt from the Employer, identified in the Acceptance part of this Agreement, of one fully completed original copy of this Agreement, including the Schedule of Deviations (if any) today:

the(day)

of...(month)

20.....(year)

at...(place)

For the Contractor:

Signature

Name

Capacity

Signature and name of witness:

Signature

Name

VHEMBE DISTRICT MUNICIPALITY**REFURBISHMENT OF HARPER WASTEWATER TREATMENT
WORKS AND PUMP STATION****VDM/TECH/17/03/2026/03****C1.2 CONTRACT DATA FOR: TENDER VDM/TECH/17/03/2026/03– REFURBISHMENT
OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION****Part 1: DATA PROVIDED BY THE EMPLOYER****CONDITIONS OF CONTRACT**

The General Conditions of Contract for Construction Works, Third Edition, 2015 published by the South African Institution of Civil Engineering, Private Bag X 200, Halfway House, 1685, are applicable to this Contract and it is obtainable from www.saice.org.za.

CONTRACT SPECIFIC DATA

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

Compulsory Data**Clause 1.1.1.5**

“Commencement date” shall be the date upon receipt of the “Letter of Acceptance, indicating the acceptance of the tender by the Client.

Clause 1.1.1.13

The Defects Liability Period is 12 months.

Clause 1.1.1.14:

The time for achieving Practical Completion is **6 months** or less as specified by tenderer.

Clause 1.1.1.15:

The name of the Employer is: **Vhembe District Municipality**

Clause 1.1.1.16:

The Engineer is: **HWA Engineers and Project Managers**

Clause 1.1.1.26:

The Pricing Strategy is Re-measurement Contract.

Clause 1.2.1.2:**The address of the Employer is:**

Vhembe District Municipality Offices	Vhembe District Municipality
Next to Khoroni Hotel (former Tusk Hotel) Private Bag x 5006	
Thohoyandou	Thohoyandou
0950	0950

Tel: 015 960 2000

Fax: 015 960 2000

The address of the Engineer is:**HWA Engineers and Project Managers**

127 Marshall Street

P.O Box 3472

Polokwane

Polokwane

0700

0700

Tel: 015 297 5906

E-mail: admin@hwaeng.co.za**Clause 3.1.3**

The Engineer is required in terms of his appointment with the Employer to obtain the following specific approvals from the Employer:

39. Certify additional costs/expenditure
40. Taking over of the Works
41. Determining extension of Time for completion

Clause 4.3

Add the following at the end of subclause 4.3:

- i. Provisions of Section 37 (2) of the Occupational Health and Safety Amendment Act 1993 (Act 85 of 1993),
- i. The contractor undertakes to acquaint the appropriate officials and employees of the contractor with all relevant provisions of the Act and the regulations promulgated in terms of the Act and fully comply with the relevant duties, obligations and prohibitions imposed in terms of the Act.
- ii. Construction Regulations 2014
1. Acquaint himself with the requirements of the Employer's Health and safety specification as laid down in regulation 4 (1) (a) of the Construction Regulation 2014.
- iii. Other legal provision to comply with but not limited to:
 - i Explosives (Explosive Act 26 of 1956)
 - ii Compensation for Occupational Injuries and Diseases Act 130 of 1993
 - iii National Environmental Management Act 107 of 1998.

Clause 5.3.1:

The documentation required before commencement with Works execution are:

- Health and Safety Plan (Refer to Clause 4.3)
- Initial Programme (Refer to Clause 5.6)
- Security/guarantee (Refer to Clause 6.2)
- Insurance (Refer to Clause 8.6)

Clause 5.3.2:

The time to submit the documentation required before commencement with Works is 28 days.

Clause 5.4.1

Add the following paragraph to sub clause 5.4.1 – “Access to the site and the issuing of working drawings will be done once an approved guarantee has been submitted and subject to the Contractor having an approved project specific health and safety plan in terms of the Occupational Health and Safety Act 1993. Construction Regulations 2003 and complied with the initial requirements thereof”

Clause 5.8.1:

The non-working days are: Sundays .

The special non-working days are:

- Public Holidays.
- The year-end break commencing on 14 December 2026 and ending on 04 January 2027 or as per the industry norm for the specific year.

Clause 5.12.1

No extension of time for Practical Completion shall be taken into account for days as indicated in clause 5.8.1. above.

Clause 5.13.1:

The penalty for failing to complete the Works is 0.01% of contract value per calendar day.

Clause 5.16.3:

The latent defect period is 10 years.

Clause 6.2.1

The form of Guarantee is to contain the wording of the document as included in the Pro Forma in Part C1.3. The liability of the guarantee shall be for the amount of 10% of the Contract Price

Clause 6.5.1.2.3:

The percentage allowance to cover overhead charges is 10%.

Clause 6.10.1.5:

The percentage advance on materials not yet built into the Permanent Works is 80%

Clause 6.10.3:

The limit of retention money is 10%.

Clause 8.6.1.1.2:

The value of Plant and materials supplied by the Employer to be included in the insurance sum is **R 1 million.**

Clause 8.6.1.1.3:

The amount to cover professional fees for repairing damage and loss to be included in the insurance is **R 1 million.**

Clause 8.6.1.3

The limit of indemnity for liability insurance is **R 5 million.**

Clause 10.5.2

Dispute resolution is by ad-hoc adjudication.

Clause 10.5.3

The number of Adjudication Board members to be appointed is three.

Clause 10.7.1

The determination of disputes shall be by arbitration.

PART 2: DATA PROVIDED BY THE CONTRACTOR**Clause 1.1.1.9:**

The name of the Contractor is:

Clause 1.2.1.2:

The address of the Contractor is:

Physical Address

Postal Address

.....

.....

.....

.....

.....

.....

.....

.....

Tel.:

Fax:

E-mail:

Clause 1.1.1.14:

The time for achieving Practical Completion for the portions as set out in the Scope of Works is:

99% of works.

The time for achieving Practical Completion of the whole Works is 6 months or as specified by tenderer.

Clause 6.2.1:

The security to be provided by the Contractor shall be one of the following:

Type of security	Contractor's choice. Indicate "Yes" or "No"
Cash Deposit of 10% of the Contract Sum, VAT Inclusive.	
Performance guarantee of 10% of the Contract Sum, VAT Inclusive	
Retention of 10% of the value of Works.	
Cash Deposit of 10% of the Contract Sum plus retention of 10% of the value of Works, VAT Inclusive	

Note: in the Standard for Uniformity in Construction Procurement in section 4.4.3.4 it is stated that: "Retention monies that are held shall not exceed 10% of any amount due to a contractor.

Where guarantees of an insurance company or bank that are provided are equal to or greater than 10% of the contract price, the total amount of retention monies held shall not exceed 5% of the contract price."

Clause 6.5.1.2.3:

The percentage allowance to overhead charges is 10% or less.

Clause 6.8.3:

The variation in cost of special materials exclusive of VAT is:

Type of Special Material	Unit	Price/Rate

VHEMBE DISTRICT MUNICIPALITY

REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION

VDM/TECH/17/03/2026/03

PRO FORMA

C1.3. PERFORMANCE GUARANTEE

For use with the General Conditions of Contract for Construction Works, 3rd Edition, 2015.

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means:

Physical address:

"Employer" means: **VHEMBE DISTRICT MUNICIPALITY**

"Contractor" means:

"Engineer" means: **HWA ENGINEERS AND PROJECT MANAGERS**

"Works" means: **REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP
STATION**

"Site" means: the settlement listed on section C3.1.18 of this Tender Document.

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

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

Amount in words:

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

Amount in words:

"Expiry Date" means:

CONTRACT DETAILS

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

PERFORMANCE GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.
2. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to the date of issue by the Engineer of the Certificate of Completion of the Works or the date of payment in full of the Guarantee Sum. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.
3. The Guarantor hereby acknowledge 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 intension whatsoever to create an accessory obligation or any intension 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 issued by the Employer to the Contractor stating that payment of a sum certified by the Engineer 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 with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid.
 - 4.3. A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.
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 calling upon this Performance Guarantee, such demand stating that:
 - 5.1. The contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 5; or
 - 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. Where the Guarantor has made payment in terms of 5, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Performance Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this

Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.

8. Payment by the Guarantor in terms of 4 and 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
9. Payment by the Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.
10. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
11. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.
12. This Performance Guarantee is neither negotiable nor transferrable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
13. 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.
14. Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district have jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at.....

Date.....

Guarantor's signatory (1)

Capacity

Guarantor's signatory (2)

Capacity

Witness signatory (1)

Witness signatory (2)

VHEMBE DISTRICT MUNICIPALITY**REFURBISHMENT OF HARPER WASTEWATER TREATMENT
WORKS AND PUMP STATION****VDM/TECH/17/03/2026/03****C1.4 DISCLOSURE STATEMENT**

Date:

Contract:

Employer:

Engineer:

Dear Sirs

I am willing and available to serve as (*ad-hoc/standing*) Adjudication Board Member in the above-mentioned Contract.

In accordance with the General Conditions of Contract for Construction Works Adjudication Board Rules relating to disclosure statements by selected or nominated persons to the adjudication, I hereby state that:

- I shall act with complete impartiality and know of nothing at this time, which could affect my impartiality
- I have had no previous involvement with this project.
- I do not have any financial interest in this project
- I am not currently employed by the Contractor, Employer or Engineer.
- I do not have any financial connections with the Contractor, Employer or Engineer.
- I do not have or have not had a personal relationship with any authoritative member of the Contractor, Employer or the Engineer which could affect my impartiality.
- I undertake to immediately disclose to the parties any changes in the above position which could affect my impartiality or be perceived to affect same

Should there be any deviation from the foregoing statements, details shall be given.

I further declare that I am experienced in the work which is carried out under the Contract in interpreting contract documentation.

Name in Full:

Signature:

VHEMBE DISTRICT MUNICIPALITY**REFURBISHMENT OF HARPER WASTEWATER TREATMENT
WORKS AND PUMP STATION****VDM/TECH/17/03/2026/03****PRO FORMA****C1.5. ADJUDICATION BOARD MEMBER AGREEMENT**

This Agreement is entered into between:

Adjudication Board Member:**Name:**

.....

Surname:

.....

Physical Address

.....

.....

.....

.....

Postal Address

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Tel.:

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Fax.

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Mobile:

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E-mail:

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Contractor:**Name:**

.....

Surname:

.....

Physical Address

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Postal Address

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Tel.:

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Fax.

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Mobile :

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E-mail:

.....

Employer**Name:**

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Surname:

.....

Physical Address

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Postal Address

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Tel.:

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Fax.

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Mobile :

.....

E-mail:

.....

The Contractor and the Employer will hereinafter be collectively referred to as the Parties.

The parties entered into a Contract for REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION which provides that a dispute under or in connection with the General Conditions of Contract for Construction Works, 3rd Edition, 2015, must be referred to (*ad-hoc adjudication/standing adjudication.*)

The undersigned natural person has been appointed to serve as Adjudication Board Member and together with the undersigned Parties agree as follows:

1. The Adjudication Board Member accepts to perform his duties in accordance with the terms of the Contract, the General Condition of Contract for Construction Works Adjudication Board Rules and this Agreement.
2. The Adjudicator undertakes to remain independent and impartial of the Contractor, Employer and Engineer for the duration of the Adjudication Board proceedings.
3. The Adjudication Board Member agrees to serve for the duration of the Adjudication Board Proceedings.
4. The Parties may at any time, without cause and with immediate effect, jointly terminate this Agreement.
5. Unless the Parties agree, the Adjudication Board Member shall not act as arbitrator or representative of either Party in any subsequent proceedings between the Parties under the Contract. No Party may call the Adjudication Board Member as a witness in any such subsequent proceedings.
6. The standing Adjudication Board's duties shall end upon the Adjudication Board Member(s) receiving notice from the Parties of their joint decision to disband the Adjudication Board.
7. The Adjudication Board Member shall be paid in respect of time spent upon or in connection with the adjudication including time spent travelling:

- a) A monthly retainer of (R.....) for (.....) of months, and/or
- b) A daily fee of (R.....) based on a (.....) hour day, and/or
- c) An hourly fee of (R.....), and/or
- d) A non-recurrent appointment fee of (R.....) which shall be accounted for in the final sums payable.

8. The Adjudication Board Member's expenses incurred in adjudication work shall be reimbursed at cost.

Upon submission of an invoice for fees and expenses to the Parties, the Employer shall pay the full amount within 28 days of receipt of the invoice and he shall be reimbursed by the other party by half the amount so that the fees and expenses are borne equally by the Parties. Late payment of such invoice shall attract interest at prime plus 3% points compounded monthly at the prime rate charged by the Adjudication Board Member's bank.

This Agreement is entered into by:

Contractor's signature

Contractor's name

Place

Date

Employer's signature

Employer's name

Place

Date

Adjudication Board Member's signature

Adjudication Board Member's Signature

Place

Date

VHEMBE DISTRICT MUNICIPALITY

REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION

VDM/TECH/17/03/2026/03

C2: PRICING DATA

C2.1 Pricing Instructions

1 Measurement and payment shall be in accordance with the relevant provisions of clause 8 of each of the SANS 1200 Standardised Specifications for Civil Engineering Construction referred to in the Scope of Work. The Preliminary and General items shall be measured in accordance with the provisions of SANS 1200-A, *General*.

2. The units of measurement described in the Bills of Quantities are metric units. Abbreviations used in these Bills of Quantities are as follows:

%	=	percent
h	=	hour
ha	=	hectare
kg	=	kilogram
kl	=	kilolitre
km	=	kilometre
km-pass	=	kilometre-pass
kPa	=	kilopascal
kW	=	kilowatt
l	=	litre
m	=	metre
mm	=	millimetre
m ²	=	square metre
m ² -pass	=	square metre-pass
m ³	=	cubic metre
m ³ -km	=	cubic metre-kilometre
MN	=	meganewton
MN.m	=	meganewton-metre
MPa	=	megapascal
No.	=	number
Prov sum	=	Provisional sum
PC sum	=	Prime Cost sum

R/only	=	Rate only
sum	=	lump sum
t	=	ton (1000 kg)
W/day	=	Work day

3. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.
4. The prices and rates in these Bills of Quantities are fully inclusive prices for the work described under the items. Such prices and rates cover all costs and expenses that may be required in and for the execution of the work described in accordance with the provisions of the Scope of Work, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the Contract Data, as well as overhead charges and profit. These prices will be used as a basis for assessment of payment for additional work that may have to be carried out.
5. It will be assumed that prices included in these Bills of Quantities are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for Tenders. (Refer to www.stanza.org.za or www.iso.org for information on standards)
6. Where the Scope of Work requires detailed drawings and designs or other information to be provided, all costs associated therewith are deemed to have been provided for and included in the unit rates and sum amount Tendered such items
7. An item against which no price is entered will be considered to be covered by the other prices or rates in the Bills of Quantities. A single lump sum will apply should a number of items be grouped together for pricing purposes.
8. 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.
9. Reasonable compensation will be received where no pay item appears in respect of work required in the Bills of Quantities in terms of the Contract and which is not covered in any other pay item.
10. The short descriptions of the items of payment given in these Bills of Quantities are only for the purposes of identifying the items. More details regarding the extent of the work entailed under each item appear in the Scope of Work.
11. Descriptions in the Bills of Quantities are abbreviated and comply generally with those in the SANS 1200 Standardised Specifications.

12. Those parts of the contract to be constructed using labour-intensive methods have been identified in the scope of works. **Tenderers must price such works so as to allow for Labour-intensive construction methods.** The works, or parts of the works so designated are to be constructed using labour-intensive methods only. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a variation to the contract.
13. Payment for items which are designated to be constructed labour-intensively 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.

C2.2 DAY WORK LIST

C2.2.1 GENERAL

Contractors must complete this list, which will be used to assess the value of work that the Engineer instructs in writing to be done on a day work basis, all in agreement with clause 6.4.1.4 of the General Conditions of Contract, 2015 (3rd edition) and coupled Special Conditions of Contract. All the rates are fixed and shall be binding till the issuing of the final certificate, except for statutory increases that are announced from time to time. These unit rates shall be an all inclusive rate.

C2.2.2 LABOUR COSTS

Rates for labour as listed below shall include all the allowances as specified in the General Conditions of Contract, 2015 (3rd edition) and Special Conditions of Contract. The extra allowance, applicable on Labour costs listed below, is given in the tender appendix and must not be taken into account in this list.

Overtime costs incurred by this contract shall be paid in the same proportion as the amounts actually paid to the employees.

DESCRIPTION	UNIT	RATE
Unskilled labour	Hour	R
Semi-skilled labour	Hour	R
Skilled labour	Hour	R
Foreman I Section leader	Hour	R
Surveyor	Hour	R
Surveyor's assistant	Hour	R

C2.2.3 EQUIPMENT COST

Full comprehensive hourly rates, which also include the cost of operators, must be listed below. Rates must also include all the costs of consumable items, maintenance, depreciation, tools, and all other coincidences that shall be necessary to operate the equipment for the purpose it is designed for. The rates must also include all the overhead costs, profits, site supervision, insurance, holidays with payment, travelling costs (or travelling allowances) and residence allowances of operators and any other allowances that are applicable on equipment. The Tenderer must list under each heading the make and specification of the equipment available.

DESCRIPTION	UNIT	RATE
a) Hydraulic, crawler mounted excavators (Caterpillar 325 type or similar with 1 cubic meter bucket)	Hour	R
b) Front-end loader (Caterpillar 939 type or similar)	Hour	R.....
c) Bulldozer Caterpillar D6 type or similar Caterpillar D7 type or similar	Hour Hour	R..... R.....
d) Grader (Caterpillar 140G or similar)	Hour	R.....
e) Hydraulic tractor mounted backhoe (JCB 3C or similar)	Hour	R.....
f) Tipper Trucks 6m ³ 10m ³	Hour Hour	R..... R.....
g) Water Truck 5000 litres 10000 litres	Hour Hour	R..... R.....
h) Tractor drawn 10 ton grid roller 10 ton flat roller Trailer	Hour Hour Hour	R..... R..... R.....
i) Roller 8 ton wheeled pneumatic tyred self propelled road roller	Hour	R.....

DESCRIPTION	UNIT	RATE
j) Concrete mixer 75 litre concrete mixer	Hour	R
k) Vibratory poker	Hour	R.....
l) Compressor Mobile compressor, 4,7 cubic metres per minute, including hoses	Hour	R.....
m) Accessories for compressor Rock drill and rods	Hour	R.....
Jackhammer and steels	Hour	R.....
n) Water pumps including hoses and suction connector		
75mm	Hour	R.....
100mm	Hour	R.....
150mm	Hour	R.....
o) Compactors Vibratory plate 400mm sq.	Hour	R.....
Vibratory drum roller 650mm wide	Hour	R.....
Rammers	Hour	R.....
p) LDV, capacity 1.5 ton	Hour	R.....
q) Honey Sucker		
10 m ³	Hour	R.....
12 m ³	Hour	R.....
16 m ³	Hour	R.....
r) Mobile Crane		
10 ton	Hour	R.....
s) Other equipment		
.....	Hour	R.....
.....	Hour	R.....
.....	Hour	R.....

C2.3 PREAMBLE TO SCHEDULE OF QUANTITIES

C2.3.1 GENERAL

The General conditions of Contract, the Special Conditions of Contract (if any), the Specifications (including the project Specification) and the Drawings are to be read in conjunction with the Schedule of Quantities.

- C2.3.2**
- (a) The Schedule comprises items covering the Contractor's profit and costs of general liabilities and of the construction of temporary and permanent works.
 - (b) Although the Tenderer is at liberty a rate of his own choosing for each item in the Schedule, his attention is drawn to the fact that the Contractor has the right, under various circumstances, to payment for additional works carried out and that the Engineer is obliged to base his assessment of the rates to be paid for such additional work on the rates inserted in the schedule by the Contractor.
 - (c) Clause 8 of each standardized specification and the measurement and payment clause of each particular specification, read together with the relevant clause of the project specification, set out what ancillary or associated activities are included in the rates for the operations specified.

- C2.3.3** Description in the Schedule of Quantities is abbreviated and the schedule has been drawn up generally in accordance with the latest issue of The Standard System of Measurement of Civil Engineering Quantities for South Africa, published by the South African Institution of Civil Engineers.

Should any requirement of the measurement and payment clause of the applicable standardized specification, or the project specification, or the particular specification(s), conflict with the terms of the schedule, the requirement of the Standardized, Project, or Particular Specification applicable, shall prevail.

- C2.3.4** Unless otherwise stated, items are measured Nett in accordance with the drawings and no allowance has been made for waste.

- C2.3.5** The prices and rates to be inserted in the schedule of quantities are to be the fully inclusive prices for the work described under the several items. Such prices shall cover all costs and expenses that may be required in and for the construction 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 tender is based.

- C2.3.6** A price or rate is to be entered against each item in the Schedule 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 schedule.

C2.3.7 The Tenderer must price each item in the schedule of quantities in **BLACK ink**.

C2.3.8 Where any discrepancy exists between the unit price and the extended total against such item, the discrepancy will be adjusted by altering the total amount filled in against such item and consequently the total tendered sum.

C2.3.9 In cases where unit rates are considered too high, such rates may be of sufficient importance to warrant of a tender by the Client.

C2.3.10 Provisional Sums

In this schedule, items against which "Provisional Sums" are allowed are intended to provide special works and operations either anticipated or problematical, the scope and extent of which cannot be forecast. The Provisional Sum allowed will be used (as decided by the Engineer) for these works to be carried out under this contract at applicable schedule rates or on a day work basis or alternatively, the Engineer may decide to utilize these provisional sums for carrying out this work departmentally or by some other Contractor.

C2.4 Quantities Provisional Only

- C2.4.1** The quantities given in the Schedules are provisional only and the Contractor will be paid for the actual amount of work done at the rates tendered. The accuracy or inaccuracy of the Quantities given in the Schedules of Quantities shall in no way affect the validity of the Tender or the Contract based thereon.

Notwithstanding anything to the contrary in the Conditions of Contract, the Contractor is to satisfy himself when ordering materials that such materials will actually be required for inclusion in the works as no payment will be made for materials ordered and delivered to site and then found to be in excess of the quantity actually required.

C2.5 BILLS OF QUANTITIES

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 1: PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	SABS 1200 A	<u>PRELIMINARY AND GENERAL</u>				
1.1	P SA 5.1	<u>FIXED-CHARGE ITEMS</u>				
1.1.1	5.1.1	Contractual Requirements	Sum	1		
1.1.2	P.S A 5.1.2	Establishment of facilities on site				
1.1.2.1	PSA 5.1.2.1	Facilities for the Engineer				
		(a) Furnished offices Not Less Than 18m ²	Sum	1		
		(b) Telephone	Prov Sum	1	R 15,000.00	R 15,000.00
		(c) Nameboards	No	2		
		(d) Survey Assistant	Sum	1		
		(e) Survey Equipment	PC Sum	1	R 10,000.00	R 10,000.00
		(f) Overhead costs on item 1.1.2.1 (b) and (e)	%	25000		
1.1.2.2	PSA 5.1.2.2	Facilities for the Contractor				
		(a) Offices and Storage Sheds	Sum	1		
		(b) Workshops	Sum	1		
		(c) Laboratories	Sum	1		
		(d) Living accommodation	Sum	1		
		(e) Ablution and latrine facilities	Sum	1		
		(f) Tools and equipment	Sum	1		
		(g) Water supplies, electric power and communications	Sum	1		
	PSA 3.4	(h) Dealing with water	Sum	1		
		(i) Access	Sum	1		
1.1.3	PS A 5.1.3	Other fixed-charge obligations (including protection of all property entered upon)	Sum	1		
1.1.4	PS A 5.3.4	Removal of Contractor's and Engineer's site establishment on completion	Sum	1		
	1200 A	TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 1: PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
1.1.5	PSAB 5.3.6	<u>Occupational Health and Safety</u>				
		(a) Preparation of Health and Safety Plan	Sum	1		
		(b) Health and Safety Training	Sum	1		
		(c) Personal Protective Clothing and Equipment	Sum	1		
		(d) Fences, Signs and Barricades	Sum	1		
		(e) Establishment of Safety Administration	Sum	1		
1.2	PS A 5.2.2	<u>TIME-RELATED ITEMS</u>				
1.2.1	5.2.1	Contractual requirements	Sum	1		
1.2.2	PS A 5.2.2	<u>Operation and maintenance of facilities on the site for the duration of construction period except otherwise where stated</u>				
1.2.2.1	PS A 5.2.2.1	<u>Facilities for the Engineer</u>				
		(a) Furnished offices	Sum	1		
		(b) Telephone	Prov Sum	1	R 10,000.00	R 10,000.00
		(c) Overhead costs for Item (b) above	%	R 10,000.00		
1.2.2.2	PS A 5.2.2.2	<u>Facilities for the Contractor</u>				
		(a) Offices and storage sheds	Sum	1		
		(b) Workshops	Sum	1		
		(c) Laboratories	Sum	1		
		(d) Living accommodation	Sum	1		
		(e) Ablution and latrine facilities	Sum	1		
		(f) Tools and equipment	Sum	1		
	1200 A	TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 1: PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
		(g) Water supplies, electric power and sewer	Sum	1		
		(h) Dealing with water	Sum	1		
		(i) Access	Sum	1		
1.2.3		Time related obligations				
	PS A 5.2.3	a) Construction supervision	Months	6		
	PS A 5.2.4	b) Head Office Overhead costs for duration of the project	Months	6		
1.2.4	PSA B 5.3.5	Contractor's time-related obligations in respect of Occupational Health and Safety Act Regulations inclusive of Covid 19 Regulations.	Months	6		
1.2.5		Contractor's time-related obligations in respect of environmental plans and specifications.	Months	6		
1.3	PSA 5.3	Sums stated provisionally by the engineer:				
1.3.1	PSA 5.3.1	Monthly payment of salary for the Community Liaison Officers (1 CLO)	Prov Sum	1	R 60,000.00	R 60,000.00
1.3.2		Monthly payment of PSC Members Seating for meetings. R200/person/seating for a maximum of 10 People for 6 months	Prov Sum	1	R 12,000.00	R 12,000.00
1.3.3		Overhead costs, charges and profit on item 1.3.1 and 1.3.2 above	%	R 72,000.00		
1.3.4	PSA 5.3.6	Engineer's Administration to the Contractor and monitoring of OHS requirements on the project	Prov Sum	1	R 300,000.00	R300,000.00
1.3.5	PSA 5.3.6	Engineer's Administration to the Contractor and monitoring of environmental management plan requirements on the project.	Prov Sum	1	R 240,000.00	R240,000.00
1.3.6		Social Facilitation	Prov Sum	1	R 240,000.00	R240,000.00
1.3.7		Overhead costs, charges and profit on item 1.3.4, 1.3.5 and 1.3.6 above	%	R780,000.00		
	1200 A	TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 1: PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
1.3.8		Generic skills	Prov Sum	1	R 30,000.00	R 30,000.00
1.3.9		Entrepreneurial skills	Prov Sum	1	R 15,000.00	R 15,000.00
1.3.10		Monthly payment of salary for Students in training (1 Student) @ R10000.00	Prov Sum	1	R 60,000.00	R 60,000.00
1.3.11		Payment of labourers whilst under training for 5 days @ 288,092 per Labourer	Prov Sum	1	R 8,000.00	R 8,000.00
1.3.12	PSA 5.5	Overhead costs, charges and profit on item 1.3.8, 1.3.9, 1.3.10 and 1.3.11 above	%	R113,000.00		
1.3.13		Accommodation for Engineer's Representative	Prov Sum	1	R 36,000.00	R 36,000.00
1.3.14		Overhead costs for item 1.3.13 above	%	R 36,000.00		
1.4	PSA8-5 8.6	Prime cost sums: Allow for establishment of an independent lab on site as directed by the Engineer. The lab to conduct tests including steel pipe structural integrity, compaction tests, concrete tests				
1.4.1		Allow for establishment of an independent lab on site as directed by the Engineer. The lab to conduct tests including steel pipe structural integrity, compaction tests, concrete tests	PC Sum	1	R 50,000.00	R 50,000.00
1.4.2		Charge required by Contractor on sub item 1.4.1 above	%	R 50,000.00		
1.5		Water Use License Application (WULA)				
1.5.1		Specialist Studies & Investigations	Prov. Sum	1	R 75,000.00	R 75,000.00
1.5.2		WULA Report Compilation	Prov. Sum	1	R 25,000.00	R 25,000.00
1.5.3		Application submission to DWS, including payment of associated application fees	Prov. Sum	1	R 50,000.00	R 50,000.00
1.5.4		Charge required by Contractor on sub items 1.5.1 to 1.5.3 above	%	R150,000.00		
	1200 A	TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 1: PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
1.6		Temporary works The Contractor shall design and implement all temporary works wastewater required to maintain uninterrupted treatment operations and compliance with effluent discharge standards for the full duration of the refurbishment				
1.6.1		Design, supply, installation, operation and maintenance of temporary bypass pumping system (including pumps, pipes, valves, fittings, standby units and power supply) to divert influent/effluent flows during refurbishment.	Prov. Sum	1	R 100,000.00	R100,000.00
1.6.2		Provision of temporary pipework for flow diversion	Prov. Sum	1	R 50,000.00	R 50,000.00
1.6.3		Provision of temporary power supply (generators, fuel, cabling, distribution boards) for operation of temporary works.	Prov. Sum	1	R 75,000.00	R 75,000.00
1.6.4		Removal of all temporary works, making good, and reinstatement of affected areas upon completion.	Prov. Sum	1	R 10,000.00	R 10,000.00
1.6.5		Charge required by Contractor on sub items 1.6.1 to 1.6.4 above	%	235,000.00		
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 2: DAYWORKS**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
2.1	SANS 1200 A 8.7	DAYWORKS AND TEMPORARY WORKS DAYWORKS Note : Dayworks executed on instruction of the Engineer only				
2.1.1	8.7	LABOUR (a) Skilled (b) Semi-skilled (c) Un-skilled	hr hr hr			Rate Only Rate Only Rate Only
2.1.2	8.7	PLANT HIRE (WORK RATES ON SITE) (a) Tipper trucks (specify capacity) (i) Capacity____ 5 m³ (small) (ii) Capacity____ 10 m³ (medium) (b) LDV (specify size) (i) LDV____ 1 ton (c) Water tankers (specify capacity) (i) Capacity____ 5 m³ (small) (ii) Capacity____ 10 m³ (medium) (d) Crawler excavators (specify model/mass/kw) (i) Model____ / ____ /kg 150 kw (small) (e) TLB'S (i) Tractor loader backhoe (TLB)(specify model) (ii) Model_____ (f) Mobile crane (i) Mass 10 tonnes (g) Jack hammer complete with hoses and fittings	hr hr hr km hr hr hr hr hr			Rate Only Rate Only Rate Only Rate Only Rate Only Rate Only Rate Only Rate Only Rate Only
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 2: DAYWORKS**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
		(g) Jack hammer complete with hoses and fittings	hr			Rate Only
		(h) Sludge Pump complete with hoses and clamps	hr			Rate Only
		(j) Concrete cutting machine	hr			Rate Only
		(k) Walk behind vibrating rollers (specify model)				
		(i) Model _____ (BW 61) (small)	hr			Rate Only
		(ii) Model _____ (BW 76) (medium)	hr			Rate Only
		(l) Plate compactors (specify model)				
		(i) Model _____	hr			Rate Only
		(m) Wackers (specify model)				
		(i) Model _____	hr			Rate Only
		(n) Concrete mixers (specify mixing volume)				
		(i) Volume 320 liter (small, towable)	hr			Rate Only
		(o) Portable diesel compressors (specify capacity)				
		(i) Capacity 50 cfm (small)	hr			Rate Only
		(ii) Capacity 250 cfm (medium)	hr			Rate Only
		(p) Waterpump (specify capacity)				
		(i) Capacity 30 liter/sec (small)	hr			Rate Only
		(ii) Capacity 100 liter/sec (medium)	hr			Rate Only
2.1.3	8.7	TRANSPORT COST TO AND FRO SITE				
		(a) Tractor loader backhoe (TLB)(specify model)	km			Rate Only
		(b) Low-bed (suitable for the largest piece of equipment above)	km			Rate Only
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 2: DAYWORKS**

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
		(c) Tipper truck				
		(i) Small	km			Rate Only
		(ii) Medium	km			Rate Only
		(d) Flatbed truck				
		(i) Small	km			Rate Only
		(ii) Medium	km			Rate Only
		(e) Water tanker				
		(i) Small	km			Rate Only
		(ii) Medium	km			Rate Only
		(f) Crane Truck (specify capacity)				
		(i) Capacity____ 2 t (small)	hr			Rate Only
		(ii) Capacity____ 8 t (medium)	hr			Rate Only
		G) Honey sucker (vacuum tanker, specify capacity)				
		(i) Capacity 10 m³ (small)	hr			Rate Only
		(ii) Capacity 12 m³ (medium)	hr			Rate Only
		(iii) Capacity 16 m³ (Large)	hr			Rate Only
		(ii) Capacity 250 cfm (medium)	hr			Rate Only
		(p) Waterpump (specify capacity)				
		(i) Capacity 30 liter/sec (small)	hr			Rate Only
		(ii) Capacity 100 liter/sec (medium)	hr			Rate Only
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 3: INLET WORKS**

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
3.1		INLET WORKS				
3.1.1		Inlet Channels				
3.1.1.1	1200 C	Demolition Work				
	8.2.8	(a) Demolish existing redundant reinforced concrete structures and dispose rubble on a designated municipal dumping area approx. 25km from site.	m ³	10		
3.1.1.2	1200 C	Site Clearance				
	8.2.1	(a) Clear and grub the proposed inlet channel site completely of all vegetation, shrubs and remove all trees of all sizes, debris, fences, and dispose on a site located by contractor and approved by the Engineer	m ²	25		
3.1.1.3	1200 C	Earthworks				
	8.2.10	(a) Removal of topsoil from designated area to a nominal depth of 150mm, cart away and stockpile for re-use as directed by the Engineer.	m ³	10		
3.1.1.4	1200 D	Bulk Excavation				
	8.3.3	(a) Restricted excavations for foundations, footings in all materials, stockpile, maintain, and use for backfill compacted to 95% Mod AASTHO	m ³	40		
	8.3.4	(b) Import G6 material from commercial source and compact to 95% Mod AASHTO	m ³	40		
3.1.1.5	1200 G	Formwork and Finish				
	8.2.5	(a) Smooth Formwork to narrow widths 150mm -300mm	m ²	15		
	8.2.2	(b) Formwork Smooth: Vertical sides	m ²	30		
	8.2.2	(c) Formwork Smooth: Horizontal, roof - straight	m ²	20		
		(d) Chamfer (50 x 50 mm in walls)	m	40		
3.1.1.6	1200 G	Reinforcement				
	8.3.1	(a) High Tensile steel bars for all diameters	t	2.5		
	8.3.2	(b) Supply and fix mesh ref 395 (Spacing 200mm x 200mm)	m ²	55		
		CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION**CONTRACT No: VDM/TECH/17/03/2026/03****SECTION 3: INLET WORKS**

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
3.1.1.7	1200 G	Concrete (Structural)				
		(a) 15MPa/19mm concrete to:				
	8.4.2	(i) Blinding layer horizontal - 50mm thick	m ³	5		
		(b) 25MPa/19mm concrete to:				
	8.4.1	(i) Channels	m ³	5		
		(c) 30MPa/19mm concrete to:				
	8.4.1	(i) Foundations	m ³	15		
	8.4.1	(ii) Walls	m ³	20		
	8.4.1	(iii) Inlet channel repair	m ³	5		
3.1.1.8	1200 G	Construction Joints				
	8.5	(a) Horizontal construction joints in walls with 'Sika Water Swebber Type WS 2010" (or equivalent) hydrophilic elastomer joint sealing waterstop	m	40		
		(b) 250 mm wide bitumen emulsion bandage system (Provisional)	m	40		
3.1.1.9		Screening				
		(a) Supply of bar screen unit (including frame and bars in stainless steel Grade 304 or 316). Cost to include installation and fixing of bar screens in grit channel, including alignment and setting to correct inclination as shown on dwg. 25007-03-H-03	Sum	1		
		(b) Fabricate, Supply and install 3000 mm x 2500mm stainless steel dewatering grate covers, Grade 316, 5 mm thick plate, 50 mm round openings at 100mm center to center, complete with smooth edge.	Sum	1		
3.1.2		FLOW METER CHAMBER				
	PSB2.2.2.1	(a) Supply and install a 1000mm diameter precast concrete manhole chamber as shown on dwg. 25007-03-H-03	No	2		
3.1.2.1		(b) Supply and install ultrasonic flow meter including associated fittings	No	2		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 3: INLET WORKS

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
3.1.2.2		(c) Supply and install magnetic flow meter including associated fittings	No	2		
3.1.3		INLET PIPE				
3.1.3.1		Refurbishment of the inlet pipe and manhole to suit inlet channel	m	50		
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 4: SUMP

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
4.1		DEWATERING AND DESLUDGING				
	PLDW9	Dewater and De-sludge the all the biological contractors. The rates tendered shall include the provision of the complete installation, including power supply, hoses and floating arrangements, and diversion of flow when necessary.				
4.1.1		Provision, installation, operation and maintenance of dewatering pumps (including standby pumps, hoses, pipes and fittings)	Prov. Sum	1	R 10,000.00	R 10,000.00
4.1.2		Charge required by Contractor on sub items 4.1.1 above	%	10,000.00		
4.1.3		Pumping of sludge using vacuum tankers "honey sucker" for disposal to a nearby landfill or as directed by the engineer	m ³	155		
4.1.4		Loosening and agitation of sludge using mechanical equipment or high-pressure water jets	m ³	96		
4.1.5		Manual removal of residual sludge in inaccessible areas	m ³	37		
4.1.6		Overhaul of sludge by vacuum tankers ("honey sucker") from the point of pumping to the designated disposal site as directed by the Engineer.	m ³ .km	1331		
4.2		STRUCTURAL REPAIR WORK				
4.2.1		Structural inspection and identification of concrete damage and deterioration and leaks.	Prov. Sum	1	R 25,000.00	R 25,000.00
4.2.2		Charge required by Contractor on sub items 4.2.1 above	%	25,000.00		
4.2.3		Supply all material, equipment and pressure wash to remove existing waterproofing on the wall surface. Pressure washer to discharge at minimum 140 bar	m ²	150		
4.2.3	PLRC1.1.1	Repair spalled concrete with polymer modified, fibre reinforced, low shrinkage structural repair mortar with corrosion inhibitor	m ²	160		
4.2.4	PLRC1.2.1	Seal joints with a one part, moisture curing, elastic joint sealant with high mechanical resistance (Movement capability of 35% (ASTM C 920))	m	50		
4.2.3		Supply and install 260 mm wide x 2 mm thick Sikadur Combiflex bandage system or similar approved.	m ²	16		
4.3		PUMP REPLACEMENT				
4.3.1		Supply and install submersible pump and motor set. Duty : 16 m3/h @ 11 m static head.	No.	2		
4.3.2		Pump performance test at supplier in accordance v	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 4: SUMP

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
4.3.3		Commissioning and testing on site	Sum	1		
4.3.4		Electrical hoisting equipment with a 5.5KW motor	Sum	1		
4.3.5		Removal of existing pipework and dispose as directed by the Engineer	Sum	1		
4.3.6		Replacement of sump pipework including fittings, flanges, supports, and all necessary accessories, complete. All pipework and fittings in contact with wastewater shall be manufactured from stainless steel (minimum Grade 304 or 316 where specified). Where mild steel components are used (e.g. supports or non-wetted parts), these shall be adequately protected against corrosion by hot-dip galvanising or an approved protective coating system. Rate to include commissioning, ensuring compatibility with existing infrastructure and leak-free operation.	Prov. Sum	1	R 140,000.00	R 140,000.00
4.3.7		Charge required by Contractor on sub items 4.3.6 above	%	140,000.00		
4.3.7	PLM2.9.1	Upgrade existing MCC panel including associated electrical works (cabling, level sensors and alarms)	Sum	1		
4.4		ANAEROBIC REACTORS				
4.4.1		DEWATERING AND DESLUDGING				
	PLDW 9	Dewater and De-sludge the all the biological contractors. The rates tendered shall include the provision of the complete installation, including power supply, hoses and floating arrangements, and diversion of flow when necessary.				
4.4.1.1		Provision, installation, operation and maintenance of dewatering pumps (including standby pumps, hoses, pipes and fittings)	Prov. Sum	1	R 10,000.00	R 10,000.00
4.4.1.2		Charge required by Contractor on sub items 4.4.1.1 above	%	10,000.00		
4.4.1.3		Pumping of sludge using vacuum tankers "honey sucker" for disposal to a nearby landfill or as directed by the engineer	m ³	1025		
4.4.1.4		Loosening and agitation of sludge using mechanical equipment or high-pressure water jets	m ³	635		
4.4.1.5		Manual removal of residual sludge in inaccessible areas	m ³	64		
4.4.1.6		Overhaul of sludge by vacuum tankers ("honey sucker") from the point of pumping to the designated disposal site as directed by the Engineer.	m ³ .km	6985		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 4: SUMP

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
4.4.2.1		Structural inspection and identification of concrete damage and deterioration and leaks.	Prov. Sum	1	R 20,000.00	R 20,000.00
4.4.2.2		Charge required by Contractor on sub item 4.4.2.1 above	%	20,000.00		
4.4.2.3		Supply all material, equipment and pressure wash to remove existing waterproofing on the wall surface. Pressure washer to discharge at minimum 140 bar	m ²	150		
4.4.2.4		Repair spalled concrete with polymer modified, fibre reinforced, low shrinkage structural repair mortar with corrosion inhibitor	m ²	160		
4.4.2.5		Seal joints with a one part, moisture curing, elastic joint sealant with high mechanical resistance (Movement capability of 35% (ASTM C 920))	m	50		
4.4.2.6		Supply and install 260 mm wide x 2 mm thick Sikadur Combiflex bandage system or similar approved.	m ²	16		
4.4.2		Supply, deliver, and install approved rectangular cast iron manhole covers and frames complete, in accordance with SANS 50124 / EN 124 or equivalent.	No	8		
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 5: ROTATING BIOLOGICAL CONTACTORS

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
5.1	PLDW 9	DEWATERING AND DESLUDGING				
		Dewater and De-sludge the all the biological contractor basin. The rates tendered shall include the provision of the complete installation, including power supply, hoses and floating arrangements, and diversion of flow when necessary.				
5.1.1		Provision, installation, operation and maintenance of dewatering pumps (including standby pumps, hoses, pipes and fittings)	Prov. Sum	1	R 10,000.00	R 10,000.00
5.1.2		Charge required by Contractor on sub items 5.2.1 above	%	10,000.00		
5.1.3		Pumping of sludge using vacuum tankers "honey sucker" for disposal to a nearby landfill or as directed by the engineer	m ³	24		
5.1.4		Loosening and agitation of sludge using mechanical equipment or high-pressure water jets	m ³	18		
5.1.5		Manual removal of residual sludge in inaccessible areas	m ³	12		
5.1.6		Overhaul of sludge by vacuum tankers ("honey sucker") from the point of pumping to the designated disposal site as directed by the Engineer.	m ³ .km	540		
5.2		<u>RBC ROTORS AND MOTORS</u>				
5.2.1		<u>ROTATING BIOLOGICAL CONTACTORS</u>				
5.2.1.1		Removal and disposal of existing RBC units	Sum	1		
5.2.1.2		Design, supply, installation, testing and commissioning of new 4m Long x 2m Diameter RBCs complete with media, shaft, drive system, bearings, structure, electrical and controls				
		a) Complete with media, shaft, drive system, bearings, structure, electrical and controls	No	6		
		b) Gearboxes and Motors for RBCs	No	6		
		c) Refurbishment of existing RBC basin including concrete repairs and protective coating	No	6		
5.2.1.3		Erection, installation & commissioning of plant & materials supplied under item 5.3.1.2	Sum	1		
5.2.1.4		Upgrade existing MCC panel including associated electrical works (cabling, level sensors and alarms) controls, and alarms	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 5: ROTATING BIOLOGICAL CONTACTORS

ITEM NO.	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
5.2.1.5		Commissioning of plant & equipment supplied under item 5.3.1.4	Sum	1		
5.2.1.6		Allow for the cost of returning to site if necessary and if ordered, in order to carry out tests on the plant.	Sum	1		
		Period for complete delivery of all plant and material from date of order.....weeks				
		Period in which complete erection will be affected and plant handed over to the satisfaction of the Engineer, from the date of delivery or receipt of order with erection, whichever is later.....weeks				
5.3		<u>PUMPS AND ASSOCIATED PIPEWORK</u>				
		<u>Supply of the following pump</u>				
5.3.1		HUMUS SLUDGE RECYCLE PUMP				
5.3.1.1	PSB1.41	HQ Submersible Pump or similar approved	No	2		
5.3.2		VALVES				
5.3.2.1		Provisional sum for servicing or replacement of valves and/or pipe specials	Prov Sum	1	R 30,000.00	R 30,000.00
5.3.2.2		Charge required by Contractor on sub items 5.4.2.1 above	%	30,000.00		
5.3.3		INSTALLATION AND COMMISSIONING				
5.3.3.1		Erection & installation of plant & materials supplied under item 5.4.1 and 5.4.2	Sum	1		
5.3.3.2		Commissioning of plant & equipment supplied under item 5.4.1 and 5.4.2	Sum	1		
5.3.3.3		Allow for the cost of returning to site if necessary and if ordered, in order to carry out tests on the plant.	Sum	1		
		Period for complete delivery of all plant and material from date of order.....weeks				
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 6: CLARIFIER

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
6.1		CLARIFIER				
6.1.2		DEWATERING AND DESLUDGING				
	PLDW 9	Dewater and De-sludge the clarifier. The rates tendered shall include the provision of the complete installation, including power supply, hoses and floating arrangements, and diversion of flow when necessary.				
6.1.2.1		Provision, installation, operation and maintenance of dewatering pumps (including standby pumps, hoses, pipes and fittings)	Prov. Sum	1	R 10,000.00	R 10,000.00
6.1.2.2		Charge required by Contractor on sub items 6.2.1 above	%	10,000.00		
6.1.2.3		Pumping of sludge using vacuum tankers "honey sucker" for disposal to a nearby landfill or as directed by the engineer	m ³	141		
6.1.2.4		Loosening and agitation of sludge using mechanical equipment or high-pressure water jets	m ³	78		
6.1.2.5		Manual removal of residual sludge in inaccessible areas	m ³	14		
6.1.2.6		Overhaul of sludge by vacuum tankers ("honey sucker") from the point of pumping to the designated disposal site as directed	m ³ .km	2332.6		
6.2		STRUCTURAL REPAIR WORK				
6.2.1		Structural inspection and identification of concrete damage and deterioration and leaks.	Sum	1		
6.2.2		Supply all material, equipment and pressure wash to remove existing waterproofing on the wall surface. Pressure washer to discharge at minimum 140 bar	m ²	200		
6.2.4		Seal joints with a one part, moisture curing, elastic joint sealant with high mechanical resistance (Movement capability of 35% (ASTM C 920))	m	50		
6.2.5		Supply and install 260 mm wide x 2 mm thick Sikadur Combiflex bandage system or similar approved.	m ²	250		
6.3		Walkways				
6.3.1	1200 C	Site Clearance				
	8.2.1	(a) Clear and grub the clarifier site completely of all vegetation shrubs, trees and remove all trees of all sizes, debris, fences, and dispose on a site located by contractor and approved by the Engineer	m ²	55		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 6: CLARIFIER

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
6.3.2	1200 C	Earthworks				
	8.2.10	(a) Removal of topsoil from designated area to a nominal depth of 150mm, cart away and stockpile for re-use as directed by the Engineer, spread surplus unsuitable material within free-haul	m ³	10		
6.3.3	1200 DM	Paving and Layerworks				
	8.3.3	(a) Scarify and compact a subgrade layer of 150mm and compact to 93% mod AASTHO	m ³	10		
	8.3.4	(b) Import G6 material from commercial source and compact to 95% Mod AASHTO	m ³	10		
		(c) Supply and lay 60mm Type S-A Interlocking concrete pavers. The rate shall include scarifying and compacting of ground, compacting, 20mm sand bed, 25 micron plastic sheeting and installation.	m ²	55		
6.3.4		Structural Steelworks				
6.3.4.1	1200 H	Handrailing				
		(a) Design, prepare detailed workshop drawings, supply, fabricate, delivery and installation of structural steel for: Maclock tubular ball type handrail fixed to top of concrete upstand, complete with bolts and fixings and heavy duty galvanised handrail 38 mm diam 2.5mm thick stanchions 48 mm diam 4 mm thick, bottom fixed 1000mm height, complete as per specifications				
	8.3.7	(i) Supply, fabricate, deliver, and install handrails complete with posts, rails, fixings, and finishes for all walkways, platforms, staircases, and elevated structures.	m	22		
6.3.4.2		Steel bridge Painting				
		a) Supply all materials and apply gloss enamel on steel:				
		i) Coat factory applied red oxide.	m ²	5		
		ii) Coat zinc-chromate primer.	m ²	5		
		iii) 1 universal under coat.	m ²	5		
		iv) 2 coats approved gloss enamel paint in approved colour.	m ²	5		
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 7: CHLORINE DOSING STATION

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
7.1	PSB 1.52	CHLORINE DOSING STATION				
7.1.1		Chlorine Storage Building				
7.1.1.2		Painting				
		(a) Internal Walls				
		(i) Cleaning the surface with brushing, chipping, scrapping, removing dust apply 2 coats on the entire inner walls with approved PVA interior paint containing a biocide strictly in accordance with the manufactures recommendations. Rate to include supply of all materials and tools to be used	m ²	30		
7.1.1.3		Ironmongery				
		(a) Cleaning the surface with brushing, chipping, scrapping, removing dust and loose particles, then paint two coats of steel oxide primer and two coats of gloss enamel paint. accordance with the manufactures recommendations. Rate to include supply of all materials and tools to be used.				
		(i) Window frames 900mm wide x 1200mm high	No	1		
		(ii) Steel door and frame 2100mm x 900mm wide	No	1		
		(iii) Burglar bars for windows 900mm x 1200mm	No	1		
7.2		CHLORINE CONTACT TANK				
7.2.1	PLDW 9	DEWATERING AND DESLUDGING Dewater and De-sludge the all the biological contractors. The rates tendered shall include the provision of the complete installation, including power supply, hoses and floating arrangements, and diversion of flow when necessary.				
7.2.1.1		Provision, installation, operation and maintenance of dewatering pumps (including standby pumps, hoses, pipes and fittings)	Prov. Sum	1	R 10,000.00	R 10,000.00
7.2.1.2		Charge required by Contractor on sub items 7.2.1.1 above	%	10,000.00		
7.2.1.3		Pumping of sludge using vacuum tankers "honey sucker" for disposal to a nearby landfill or as directed by the engineer	m ³	1		
7.2.1.4		Loosening and agitation of sludge using mechanical equipment or high-pressure water jets	m ³	1		
7.2.1.5		Manual removal of residual sludge in inaccessible areas	m ³	2		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 7: CHLORINE DOSING STATION

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
7.2.1.6		Overhaul of sludge by vacuum tankers ("honey sucker") from the point of pumping to the designated disposal site as directed	m ³ .km	249		
7.2.2		STRUCTURAL REPAIR WORK				
7.2.2.1		Repair spalled concrete with polymer modified, fibre reinforced, low shrinkage structural repair mortar with corrosion inhibitor	m ²	36		
7.2.2.2		Seal joints with a one part, moisture curing, elastic joint sealant with high mechanical resistance (Movement capability of 35% (ASTM C 920))	m	30		
7.3		CHLORINE HANDLING AND DOSING EQUIPMENT				
		Supply the following equipment.				
7.3.1	PSB 1.52	CHLORINATION EQUIPMENT				
7.3.1.1		100 L Sodium hypochlorite make up tank.	Sum	1		
7.3.1.2		Grundfos or similar approved dosing pump	No	1		
7.3.1.3		Provide sufficient bagged sodium hypochlorite to last three months	Sum	1		
7.3.2		INSTALLATION AND COMMISSIONING				
7.3.2.1		Erection & installation of plant & materials supplied under item 7.3.1	Sum	1		
7.3.2.2		Commissioning of plant & equipment supplied under item 7.3.1	Sum	1		
7.3.2.3		Allow for the cost of returning to site if necessary and if ordered, in order to carry out tests on the plant.	Sum	1		
		Period for complete delivery of all plant and material from date of order.....weeks				
		Period in which complete erection will be affected and plant handed over to the satisfaction of the Engineer, from the date of delivery or receipt of order with erection, whichever is later.....weeks				
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 8: STAFF ACCOMMODATION

ITEM NO.	PAYMENT REFFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
8.1		STAFF ACCOMODATION BUILDING				
8.1.1		Earthworks refer to dwg 25007-03-H-06				
	1200D	Excavation for Staff Accomodation				
8.1.1.1	8.3.2.a	Excavate in all material and form working platform of the building and use for backfill or disposal within freehaul distance	m³	150		
8.1.1.2	8.3.2.a	Import G6 material from commercial sources and compact to 95% Mod AASHTO	m³	50		
8.1.1.3		Extra over 8.1.1.1 and 8.1.1.2 for:				
	8.3.2.b	a) Intermediate excavation	m³	45		
	8.3.2.b	b) Rock excavation	m³	8		
8.1.2	1200 G	<u>Concrete</u>				
8.1.2.1	8.4.3	Strength concrete: 15MPa/19m to:				
	8.4.2	a) 15MPa Concrete to blinding - 50mm thick	m³	6		
8.1.2.2	8.4.3	Strength concrete: 25MPa/19m to:				
		a) 25MPa Concrete in foundations & bases	m³	30		
8.1.3		<u>BRICKWORK</u>				
8.1.3.1		Face brick as per COROBRICK or equal approved in 1:4 cement mortar in.				
		a) One brick wall (220mm wide) without opening.	m²	160		
		b) Half brick wall (110mm wide) without opening	m²	115		
		c) Damp proof course at top of external concrete wall.	m	50		
		d) Precast prestressed concrete lintels over doors and windows.	m	48		
		e) Supply and build in air vents. fall 25mm to minimum 20mm thick.	No	20		
		f) Granolithic floor screed finish cast to fall 25mm to minimum 20mm thick.	m²	55		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 8: STAFF ACCOMMODATION

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
8.1.3.2		g) Window sill: i) External face brick on edge. ROOF	m ²	18		
8.1.4		a) Supply and installation of SABS roof timber complete with nutec fascia boards as per engineer's design (roof timber to be treated with creosote or any approved) and roof cover comprising chomadek roof sheeting. Refer to 25007-03-H-07	m ²	55		
8.1.4.1		Door and Windows all in accordance to details on drg 25007-03-H-07 Supply, deliver and install:				
		a) Timber door complete with steel frame for 220mm thick wall with modifications where needed to accommodate operating building	No	8		
		b) Standard type NE9 steel residential window frame with 4mm clear float glass puttied in with steel window putty, 2 x standard chrome plated fittings to suit opening sashes.	No	12		
		c) Standard type NE9 window burglar proof 1600x750 of Valmatex type VEM 486/14m 35x120x4,5 thick diamond shaped meshes welded to sides of window frame.	No	8		
8.1.5		Door and Window Finishes				
8.1.5.1		a) Supply all materials and apply gloss enamel on steel: i) Coat factory applied red oxide. ii) Coat zinc-chromate primer. iii) 1 universal under coat. iv) 2 coats approved gloss enamel paint in approved colour	m ² m ² m ² m ²	5 5 5 5		
8.1.6		Office Building Electrical Wiring				
		a) Install 4 x 2.5 foot florentcent light and wiring with 2.5mmSQ wire	Sum	1		
		b) install 1 x normal socket 3 pin and wiring with 4mmSQ wire	Sum	1		
		c) Install 6 pin socket and wiring with 4mmSQ wire	Sum	1		
		d) Install 1 x DB 6 way with earthleakage and circuit breakers	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 8: STAFF ACCOMMODATION

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
8.1.7		Plumbing a) Sewers and Water Supply i) Site Clearance ii) Pipe trenches for sewer pipes iii) Supply, lay, bed and test Ø 110mm uPVC class 34 sewer pipes vii) Supply and install manhole chambers complete for rodding eyes not exceeding 1,5m deep v) Supply, lay, bed and test Ø 20mm HDPE class 10 water pipes b) Plumbing fixtures i) Supply and install flush toilet set complete with cisten and fittings ii) Supply and install wash trough iii) Supply shower and pipe fittings. c) Water supply Pipework i) Supply and installation of cold water distribution pipes to all fixtures (basin, WC, shower, bath) including pipe supports, clips, and hangers ii) Supply and installation of hot water distribution pipes to all fixtures (if applicable) including insulation, supports, and hangers iii) Supply and installation of pipe fittings (tees, elbows, reducers ,unions) required for water distribution iv) Supply and installation of isolation valves for each fixture or branch v) Pressure testing of water supply pipework and certification				
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 8: STAFF ACCOMMODATION

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
8.1.8		d) Sanitary Pipework				
		i) Supply and installation of WC soil and vent pipe including bends, access points, and connections to stack	m	9		
		ii) Supply and installation of basin, shower, and bath waste pipes including P-traps and bends.	Sum	1		
		iii) Supply and installation of all pipe fittings for sanitary drainage (tees, elbows, junctions, couplings)	Sum	1		
		iv) Supply and installation of venting pipework to prevent siphoning	m	10		
		v) Testing of sanitary pipework for water tightness and venting efficiency	Sum	1		
		WATER SUPPLY				
		(a) Supply, install and test water distribution pipeline to and from storage tank to house, including branch connections to fixtures				
		i) 50mm HDPE class 10	m	400		
		(b) Supply and installation of HDPE pipe fittings (tees, elbows, reducers, unions)	Sum	1		
		(c) Supply and installation of isolation valves for each branch or fixture connection	Sum	1		
		(d) Supply and erect galvanized steel structure 6 meter high to support 10 000 Liter Jojo water tank including concrete foundation and handrail and staircase up to the top of the tank to do maintenance	Sum	1		
		(e) Supply and fit 10 000 Liter Jojo water tank to steel structure	No	1		
		(f) Supply, deliver, and install a 100 L chlorine dosing tank with a compatible dosing pump, including all associated piping, valves, electrical connections, mounting, testing, and commissioning. The system shall be suitable for continuous disinfection of water from the storage tank or pipeline in accordance with applicable water quality standards.	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 8: STAFF ACCOMMODATION

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		BROUGHT FORWARD				
8.2		(g) Supply, deliver, install, test, and commission an electric 100l storage water heater (geyser), complete with all plumbing, electrical connections, safety devices, and accessories, for domestic or light commercial use.	Sum	1		
8.2.1		FENCING Supply and install High Security Concrete Palisade Fence complete to specifications as per drawing 25007-03-H-09	m	100		
8.3		Statutory notices.				
		i) 300mm*300mm Non metallic notice prohibiting the entrance to pump station by unauthorised persons.	Sum	1		
		ii) switchgear	Sum	1		
		iii) 500mm*300mm Sign board with instructions for treatment of electrical shock	Sum	1		
		iv) 300mm*300mm notice with instructions in case of fire	Sum	1		
		v) A4 Supply maintenance and operational manuals	Sum	1		
		vi) Supply and install to stand- fire extinguishers in 4.5kg DCP	No	2		
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 9 : HARPER WWTW ELECTRICAL WORKS

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
9.1		RBC BUILDING				
9.1.1	PSB1.32	Supply and install of the following DB - MCC 1 - Main Plant Motor Control Centre				
		i) 10KA FAT ,160A MCCB TP Modular DB MCC 1 for RBC, Chlorine dosing systems and local power in one modular MCC IP65 enclosure.The Modular MCC to be built as per SANS 10142- 1 ,3rd Edition requirements.	Sum	1		
		ii) Installation, testing and commissioning of the main MCC including FAT at 10KA	Sum	1		
		iii) Lightning protection	Sum	1		
9.1.2		Earthing and lightning protection of MCC room & stuff quotas				
9.1.2.1		Supply and installation of complete earthing and lightning protection systems. Supply and installation of BCE cable along perimeter suitably bonded to the earth spikes and base reinforcing steel				
		i) Cold commissioning	Sum	1		
		ii) Hot commissioning	Sum	1		
		iii) Certificate Of Compliance	Sum	1		
9.1.3		Install Electromagnetic flow measurement devices	Sum	2		
9.2		<u>LIGHTNING, INTERNAL AND EXTERNAL</u>				
9.2.1		Design and install earthing and lightning protection system that is suitable for Vhembe District Municipality , lightning flash density per square KM per year. The design and installation be as per SANS 62305 Part 1 - 4	Sum	1		
9.3		<u>EXTERNAL LIGHTING</u>				
9.3.1		A provision of bulkhead security lights to be installed on each side of the substation building including security guard room. The lighting in the substation to be 2 x 36W vapour proof . The contractor to calculate the required efficacy and decide number of light fittings needed in each room	Sum	1		
9.3.2		Hybrid aerial lights				
9.3.2.1		A provision of a 9M scissor mast with 4 lights facing each direction c/w flood lights	No	2		
		TOTAL CARRIED TO SUMMARY				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
10.1		INLET WORKS				
10.1.1		Inlet Channels				
10.1.1.1	1200 C	Demolition Work				
	8.2.8	(a) Demolish existing redundant reinforced concrete structures and dispose rubble on a designated municipal dumping area approx. 25km from site.	m ³	10		
10.1.1.2	1200 C	Site Clearance				
	8.2.1	(a) Clear and grub the proposed inlet channel site completely of all vegetation, shrubs and remove all trees of all sizes, debris, fences, and dispose on a site located by contractor and approved by the Engineer	m ²	25		
10.1.1.3	1200 C	Earthworks				
	8.2.10	(a) Removal of topsoil from designated area to a nominal depth of 150mm, cart away and stockpile for re-use as directed by the Engineer.	m ³	10		
10.1.1.4	1200 D	Bulk Excavation				
	8.3.3	(a) Restricted excavations for foundations, footings in all materials, stockpile, maintain, and use for backfill compacted to 95% Mod AASTHO	m ³	40		
	8.3.4	(b) Import G6 material from commercial source and compact to 95% Mod AASHTO	m ³	40		
10.1.1.5	1200 G	Formwork and Finish				
	8.2.5	(a) Smooth Formwork to narrow widths 150mm -300mm	m ²	15		
	8.2.2	(b) Formwork Smooth: Vertical sides	m ²	30		
	8.2.2	(c) Formwork Smooth: Horizontal, roof - straight	m ²	20		
		(d) Chamfer (50 x 50 mm in walls)	m	40		
10.1.1.6	1200 G	Reinforcement				
	8.3.1	(a) High Tensile steel bars for all diameters	t	2.5		
	8.3.2	(b) Supply and fix mesh ref 395 (Spacing 200mm x 200mm)	m ²	55		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.1.1.7	1200 G	Concrete (Structural)				
		(a) 15MPa/19mm concrete to:				
	8.4.2	(i) Blinding layer horizontal - 50mm thick	m ³	5		
		(b) 25MPa/19mm concrete to:				
	8.4.1	(i) Channels	m ³	5		
		(c) 30MPa/19mm concrete to:				
	8.4.1	(i) Foundations	m ³	15		
	8.4.1	(ii) Walls	m ³	20		
	8.4.1	(iii) Inlet channel repair	m ³	5		
10.1.1.8	1200 G	Construction Joints				
	8.5	(a) Horizontal construction joints in walls with 'Sika Water Swebber Type WS 2010" (or equivalent) hydrophilic elastomer joint sealing waterstop	m	40		
		(b) 250 mm wide bitumen emulsion bandage system (Provisional)	m	40		
10.1.1.9		Screening				
		(a) Supply of bar screen unit (including frame and bars in stainless steel Grade 304 or 316). Cost to include installation and fixing of bar screens in grit channel, including alignment and setting to correct inclination as shown on dwg. 25007-03-H-03	Sum	1		
		(b) Fabricate, Supply and install 3000 mm x 2500mm stainless steel dewatering grate covers, Grade 316, 5 mm thick plate, 50 mm round openings at 100mm center to center, complete <u>with smooth edge.</u>	Sum	1		
10.1.2		FLOW METER CHAMBER				
		(a) Supply and install a 1000mm diameter precast concrete manhole chamber as shown on dwg. 25007-03-H-03	No	2		
		(b) Supply and install ultrasonic flow meter including associated fittings	No	2		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.1.3		INLET PIPE				
10.1.3.1		Refurbishment of the inlet pipe and manhole to suit inlet channel	m	15		
10.2		DEWATERING AND DESLUDGING SLUMP				
	PLDW 9	Dewater and De-sludge the all the biological contractors. The rates tendered shall include the provision of the complete installation, including power supply, hoses and floating arrangements, and diversion of flow when necessary.				
10.2.1		Provision, installation, operation and maintenance of dewatering pumps (including standby pumps, hoses, pipes and fittings)	Prov. Sum	1	R 10,000.00	R 10,000.00
10.2.2		Charge required by Contractor on sub items 10.2.1 above	%	10,000.00		
10.2.3		Pumping of sludge using vacuum tankers "honey sucker" nearby landfill or as directed by the engineer	m ³	35		
10.2.4		Loosening and agitation of sludge using mechanical equipment for disposal to a or high-pressure water jets	m ³	19		
10.2.5		Manual removal of residual sludge in inaccessible areas	m ³	3		
10.2.6		Overhaul of sludge by vacuum tankers ("honey sucker") from the point of pumping to the designated disposal site as directed	m ³ .km	562.5		
10.3		PUMP HOUSE REFURBISHMENT				
10.3.1		STRUCTURAL REPAIR WORK				
10.3.1.1		Structural inspection and identification of concrete damage, deterioration and leaks.	Sum	1		
10.3.1.2		Supply all material, equipment and pressure wash to remove existing waterproofing on the wall surface. Pressure washer to discharge at minimum 140 bar	m ²	160		
10.3.1.3		Repair spalled concrete with polymer modified, fibre reinforced, low shrinkage structural repair mortar with corrosion inhibitor	m ²	80		
10.3.1.4		Supply and install 260 mm wide x 2 mm thick Sikadur Combiflex bandage system or similar approved.	m ²	15		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.4	PSB1.47	PUMP REPLACEMENT Remove existing pump and supply, install, test and commission a new submersible wastewater pump designed to meet the required duty conditions (Q=80m ³ /h; H=15m , including verification of site conditions, provision of pump curves, all mechanical and electrical connections, guide rail system, valves, and controls, complete. The Contractor shall ensure compatibility with existing infrastructure and guarantee performance.	No	2		
10.4.1		Removal of existing pipework and dispose as directed by the Engineer				
10.4.2	PSB1.19	Replacement of sump pipework including fittings, flanges, supports, and all necessary accessories, complete. All pipework and fittings in contact with wastewater shall be manufactured from stainless steel (minimum Grade 304 or 316 where specified where mild steel components are used (e.g. supports or non-wetted parts), these shall be adequately protected against corrosion by hot-dip galvanising or an approved protective coating system. Rate to include commissioning, ensuring compatibility with existing infrastructure and leak-free operation.	Sum	1		
10.4.3	PSB1.32	Electrical hoisting equipment with a 11KW motor	Sum	1		
10.4.4		Upgrade existing MCC panel including associated electrical works (cabling, level sensors and alarms) controls, and alarms	Sum	1		
10.4.5		Pump performance test at supplier in accordance with BS5316 Class B	Sum	1		
10.4.6		Commissioning and testing on site	Sum	1		
10.5		<u>MECHANICAL WORKS</u>				
10.5.1	SABS 1200 HA	Grated cover Supply and installation of stainless steel grating on the pump sump				
	8.3.8	(a) Supply and installation of new stainless steel grating RS-40	m ²	20		
10.6		Statutory notices.				
10.6.1		300mm*300mm Non metallic notice prohibiting the entrance to pump station by unauthorised persons.	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.6.2		300mm*300mm Non metallic notice prohibiting unauthorised persons tampering with or handling the switchgear	Sum	1		
10.6.3		500mm*300mm Sign board with instructions for treatment of electrical shock	Sum	1		
10.6.4		300mm*300mm notice with instructions in case of fire	Sum	1		
10.6.5		A4 Supply maintenance and operational manuals	Sum	1		
10.6.6		Supply and install to stand- fire extinguishers in 4.5kg DCP	No	2		
10.6.7		Supply and install new epoxy coated steel burglar bar frame 1.6m*2.4m with 60*3mm flat bar and 20mm bars fixed into wall with 16mm rawl bolts. Refer to dwg no 25007-03 -H - 06.	No	1		
10.7		ELECTRICITY SUPPLY				
10.7.1		Cables from transformer to MCC in P/S	m	100		
10.7.2		Pump House Electrical Wiring				
10.7.3		a) Supply and install 35mmSQ x 4 core cable from DB to new pumps.	m	70		
		b) Install 4 x 2.5 foot florentcent light and wiring with 2.5mm SQ wire	Sum	1		
		c) Install 1 x normal socket 3 pin and wiring with 4mmSQ wire	Sum	1		
		d) Install 6 pin socket and wiring with 4mmSQ wire	Sum	1		
		e) Install 1 x DB 6 way with earthleakage and circuit breakers	Sum	1		
		<u>Switchgear (Supply and Install)</u>				
10.7.4		a) Supply and install main box with 150A x three phase breaker	No	1		
10.7.5		Earthing and lightning protection of MCC quotas				
		Supply and installation of complete earthing and lightning protection systems. Supply and installation of BCE cable along perimeter, suitably bonded to the earth spikes and base reinforcing steel				
		i) Cold commissioning	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.7.6	PSB1.32	ii) Hot commissioning	Sum	1		
		iii) Certificate Of Compliance	Sum	1		
		Electric Motor Control Panel				
		i) Supply and install control panel with all fittings required to operate 2 electric motors, one duty and one standby. The control panel will be manufacture to carry 2 x 22kW motora circuits.	Sum	1		
		ii) Lightning protection	Sum	1		
10.7.7		Supply all materials and install steel door and replace with new door 'transformer door' type, H=3000mm*W=1900mm.	No	1		
10.7.8	PLCC 4	Test and commision the system and provide all the required documentation and manuals.	Sum	1		
10.7.9		Hybrid aerial lights				
		a) A provision of a 9M scissor mast with 4 lights facing each direction c/w flood lights	Sum	2		
10.7.10		Install Electromagnetic flow measurement devices	Sum	2		
10.7.11		COMMISSIONING FOR PUMPS				
		a) Testing and commission booster motor, pump installation including offload and onload , control system and sequence starting, direct and auto starting verify overflow and empty switches including 0-20 second delay timer and 0-24 hour timer	Sum	1		
10.8		OPERATOR'S OFFICE AND GUARD HOUSE				
10.8.1		<u>Earthworks</u> Refer to dwg 25007-03-H-08				
10.8.1.1	1200D	Excavation				
	8.3.2.a	(a) Excavate in all material and form working platform of the guardhouse the guardhouse and use for backfill or disposal within freehaul distance	m³	4		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
	8.3.2.a	(b) Import G6 material from borrow and compacted to 95% Mod AASHTO	m ³	3		
		(c) Extra over 10.8.1.1 (a) and (b) for:				
	8.3.2.b	i) Intermediate excavation	m ³	2		
	8.3.2.b	ii) Rock excavation	m ³	1		
10.9	1200 G	<u>Concrete</u>				
10.9.1	8.4.3	Strength concrete: 15MPa/19m to:				
	8.4.2	a) 15MPa Concrete to blinding - 50mm thick	m ³	1		
10.9.2	8.4.3	Strength concrete: 25MPa/19m to:				
	a)	25MPa Concrete in foundations & bases	m ³	2		
10.10		<u>BRICKWORK</u>				
10.10.1		Face brick as per COROBRICK or equal approved in 1:4 cement mortar				
	a)	One brick wall (220mm wide) without opening.	m ²	40		
	b)	Half brick wall (110mm wide) without opening	m ²	1		
	c)	Damp proof course at top of external concrete wall.	m	20		
	d)	Precast prestressed concrete lintels over doors and windows.	m	8		
	e)	Supply and build in air vents.	No	5		
	f)	Granolithic floor screed finish cast to fall 25mm to minimum 20mm thick.	m ²	25		
10.10.2		Window sill:				
	i)	External face brick on edge.	m ²	5		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.11		<u>ROOF COVERING</u>				
10.11.1		a) Supply and installation of SABS roof timber complete with nutec fascia boards as per engineer's design (roof timber to be treated with creosote or any approved) and roof cover comprising 0,6mm chromadek IBR roof sheeting	m ²	60		
10.11.2		Door and Windows all in accordance to details on dwg				
10.11.3		Supply, deliver and install:				
		a) Timber door complete with steel frame for 220mm thick wall with modifications where needed to accommodate operating building	No	3		
		c) Standard type NE9 steel residential window frame with 4mm clear float glass puttied in with steel window putty, 2 x standard chrome plated fittings to suit opening sashes.	No	4		
		d) Standard type NE9 window burglar proof 1600x750 of Valmatex type VEM 486/14m 35x120x4,5 thick diamond shaped meshes welded to sides of window frame.	No	4		
10.11.4		Door and Window Finishes				
		a) Supply all materials and apply gloss enamel on steel:				
		i) Coat factory applied red oxide.	m ²	5		
		ii) Coat zinc-chromate primer.	m ²	5		
		iii) 1 universal under coat.	m ²	5		
		iv) 2 coats approved gloss enamel paint in approved colour	m ²	5		
10.11.5		Office Building Electrical Wiring				
		a) Install 4 x 2.5 foot florentcent light and wiring with 2.5mmSQ wire	Sum	1		
		b) Install 1 x normal socket 3 pin and wiring with 4mmSQ wire	Sum	1		
		c) Install 6 pin socket and wiring with 4mmSQ wire	Sum	1		
		d) Install 1 x DB 6 way with earthleakage and circuit breakers	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.11.6		Plumbing				
		a) Sewers and Water Supply				
		i) Site Clearance	m ²	50		
		ii) Pipe trenches for sewer pipes	m ³	80		
		iii) Supply, lay, bed and test Ø 110mm uPVC class 34 sewer pipes	m	50		
		vii) Supply and install manhole chambers complete for rodding eyes not exceeding 1,5m deep	No	4		
		v) Supply, lay, bed and test Ø 20mm HDPE class 10 water pipes	m	30		
		c) Water supply Pipework				
		i) Supply and installation of cold water distribution pipes to all fixtures (basin, WC, shower, bath) including pipe supports,	m	18		
		ii) Supply and installation of hot water distribution pipes to all fixtures (if applicable) including insulation, supports, and hangers	m	18		
		iii) Supply and installation of pipe fittings (tees, elbows, reducers, unions) required for water distribution	Sum	1		
		iv) Supply and installation of isolation valves for each fixture or branch	No	2		
		v) Pressure testing of water supply pipework and certification	Sum	1		
		d) Sanitary Pipework				
		i) Supply and installation of WC soil and vent pipe including bends, access points, and connections to stack	m	20		
		ii) Supply and installation of basin, shower, and bath waste pipes including P-traps and bends.	Sum	1		
		iii) Supply and installation of all pipe fittings for sanitary drainage (tees, elbows, junctions, couplings)	Sum	1		
		iv) Supply and installation of venting pipework to prevent siphoning	m	10		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.12		v) Testing of sanitary pipework for water tightness and venting efficiency	Sum	1		
		b) Plumbing fixtures				
		i) Supply and install flush toilet set complete with cisten and fittings	No	1		
		ii) Supply and install wash trough	No	1		
		iii) Supply shower and pipe fittings	Sum	1		
		iv) Supply all materials and install plumbing complete for water supply and sanitary pipework	Sum	1		
		WATER SUPPLY				
		(a) Supply, install and test water distribution pipeline to and from storage tank to house, including branch connections to fixtures				
		i) 50mm HDPE class 10	m	400		
		(b) Supply and installation of HDPE pipe fittings (tees, elbows, reducers, unions)	Sum	1		
		(c) Supply and installation of isolation valves for each branch or fixture connection	Sum	1		
		(d) Supply and erect galvanized steel structure 6 meter high to support 10 000 Liter Jojo water tank including concrete foundation and handrail and staircase up to the top of the tank to do maintenance	Sum	1		
		(e) Supply and fit 10 000 Liter Jojo water tank to steel structure	No	1		
		(f) Supply, deliver, and install a 100 L chlorine dosing tank with a compatible dosing pump, including all associated piping, valves, electrical connections, mounting, testing, and commissioning. The system shall be suitable for continuous disinfection of water from the storage tank or pipeline in accordance with applicable water quality standards.	Sum	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 10: HARPER PUMP STATION REFURBISHMENT

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
		BROUGHT FORWARD				
10.13		(g) Supply, deliver, install, test, and commission an electric100l storage water heater (geyser), complete with all plumbing, electrical connections safety devices, and accessories, for domestic or light commercial use.	Sum	1		
		STORMWATER MANAGEMENT				
10.13.1	SABS 1200 LE	Concrete lining for open drains:				
		(a) Concrete (Grade 25/19MPa) including mixing, shuttering, forming of joints, curing, etc.	m³	15		
	SABS 1200 DK	(b) mesh wire reinforcement ref 395	m²	15		
		(c) Banks and dykes	m³	45		
10.14	1200 MJ	BLOCK PAVING				
10.14.1		Supply and lay interlocking concrete block paving including subgrade preparation, subbase, bedding, edge restraints, jointing, and compaction	m²	30		
10.15		Fencing				
10.15.1		Supply all materials and construct concrete palisade fence, 1.8m high Rate to include all excavations and backfilling for fence posts and razor wire. Refer to dwg no 25007-03-H-09	m	70		
10.15.2		Supply all materials and install 3.6m wide sliding steel gate with locking device and lock. Refer to dwg no 25007-03-H-09	No	1		
		TOTAL CARRIED FORWARD				

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SECTION 11: TESTING AND COMMISSIONING

ITEM NO	PAYMENT REFERS TO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
11.1		TESTING AND COMISSIONING OF PLANT				
11.1.1		Testing and commissioning of complete plant including all systems	Sum	1		
11.1.2		Preparation and submission of Operation and Maintenance Manuals	Prov. Sum	1	R 60,000.00	R 60,000.00
11.1.3		Charge required by Contractor on sub items 11.1.1 above	%	60,000		
11.2		<u>PLANT OPTIMIZATION</u>				
11.2.1		Process and plant optimization				
11.2.1.1		Plant optimization to ensure plant meets the required output and performance parameters	Prov.Sum	1	R 250,000.00	R 250,000.00
		Charge required by Contractor on sub items 11.2.1.1 above	%	250,000		
11.2.2		Integration of existing work				
11.2.2.1		Alteration and integration of existing electrical, mechanical and civil works	Prov.Sum	1	R 40,000.00	R 40,000.00
11.2.2.2		Charge required by Contractor on sub items 11.2.2.1 above	%	40,000		
11.2.3		Documentation				
11.2.3.1		Compile detailed documentation as well as detailed recordings of the final system	Prov.Sum	1	R 25,000.00	R 25,000.00
11.2.3.2		Training of Employer's personnel	Prov. Sum	1	R 150,000.00	R150,000.00
11.2.3.3		Charge required by Contractor on sub items 11.2.3.1 to11.2.3.2 above	%	465,000.00		
11.3		LABORATORY				
11.3.1		On-site Laboratory				
11.3.1.1		Equipping of on-site laboratory for testing effluent as per SANS standards. Rate toinclude supply of consumables for on-site testing of effluent	Prov.Sum	1	R 50,000.00	R 50,000.00
11.3.1.2		Charge required by Contractor on sub items 11.3.1.1 above	%	50,000.00		
TOTAL CARRIED SUMMARY						

PROJECT NAME: REFURBISHMENT OF HARPER WWTW AND PUMPSTATION

CONTRACT No: VDM/TECH/17/03/2026/03

SUMMARY OF BILLS

SECTION	DESCRIPTION	AMOUNT
SECTION 1	PRELIMINARIES AND GENERALS	
SECTION 2	DAYWORKS	
SECTION 3	INLET WORKS	
SECTION 4	SUMP	
SECTION 5	ROTATING BIOLOGICAL CONTACTOR	
SECTION 6	CLARIFIER	
SECTION 7	CHLORINE DOSING STATION	
SECTION 8	STAFF ACCOMMODATION	
SECTION 9	ELECTRICAL	
SECTION 10	HARPER PUMP STATION	
SECTION 11	TESTING AND COMMISSIONING	
	SUB-TOTAL	
	ADD CONTINGENCIES @ 10%	
	SUB-TOTAL INCLUDING CONTINGENCIES	
	ADD VAT @15%	
	TOTAL CARRIED TO FORM OF TENDER	

VHEMBE DISTRICT MUNICIPALITY**REFURBISHMENT OF HARPER WASTEWATER TREATMENT
WORKS AND PUMP STATION****VDM/TECH/17/03/2026/03****C3. SCOPE OF WORK**

In the event of any discrepancy between the Scope of Works and a part or parts of the SANS 1200 Standard Specifications, the Bill of Quantities or the Drawings, the Project Specification shall take precedence and prevail in the Contract. The term "Project Specification" must be read as "Scope of Works" wherever it appears in these standardised specifications.

C3.1 DESCRIPTION OF THE WORKS**C3.1.1 Employer's objectives**

The employer's objectives are to deliver public infrastructure using labour intensive method and that the work required be of a high standard and be completed in the shortest practical time, whereby the local community benefit throughout the entire project and also in doing so provide work place training opportunities to learners who have a Learnership Agreements with the Construction Education and Training Authority.

The actual work involved in this contract includes the following:

- Refurbishment of mechanical and electrical components
- Refurbishment of civil and structural works.

C3.1.2 Overview of the works

On this contract the aim is to provide a basic level of service, with regards to improve aspects of the current conditions. The Contract will entail a provision of the services as listed in the Project Specification.

Also with regards to EPWP requirements, 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. Time is of essence for this contract. The Tenderer shall state the time in calendar months required by him/her to complete the Works. Tenderers offering early completion dates will generally be more favourably received, other things being equal.

C3.1.3 Extent of the works

The works to be carried out comprise of:

- Construction of sewage inlet works and installation of screen basket.
- Desludge of the existing Septic tanks to remove the accumulated sludge
- Installation of new sludge pumps at the Septic tanks to pump sludge to the rotating biological contactors (RBC) channels.
- Installation of the new delivery pipework and pipe fittings.
- Construction of a new steel structure to cover the RBCs.

- Replacement of the existing rotating biological contactors and associated motors. Works will include installation of a new electric motor, civils works, and new electric supply cables.
- Installation of the new MCC to suit the new motors.
- Installation of steel hand rails on the clarifier.
- Cleaning and desludge of the RBC channels and clarifier.
- Repair of the bridge on the clarifier.
- Construction of a new operators room and guard house.
- Installation of a new concrete palisade fence, complete with an access gate and electric fence.
- Installation of an alarm system, CCTV system, and aerial lighting.
- Installation of pavement bricks for stormwater management.
- Supply and install a standby generator and a transformer

All materials used under this contract shall be SANS approved.

Settlements under this contract:

REFURBISHMENT OF HARPER WASTEWATER TREATMENT WORKS AND PUMP STATION

project shall be done at the underlisted location:

Project GPS Locations			
No.	Settlement	Latitude	Longitude
1	Harper wastewater treatment plant	30°00'31.02"E	22°21'11.57"S
2	Harper booster pump station	30°00'33.25"E	22°20'54.59"S

C3.1.4 Nature of Ground and Subsoil Conditions

The site soil is generally categorized as hard with visible rock outcrops. Test result will be made available on request. Furthermore, for verification, the Tenderers will be permitted at their own expense to make trial pits investigations of the area for ascertaining the character and nature of the sub-strata. Written permission shall first be obtained from the Engineer before undertaking such work. It is the Contractor's responsibility in terms of the General Conditions of Contract, to satisfy himself as to the conditions on the site and the possible variation thereto due to seasonal effects.

C3.1.5 CONSTRUCTION PROGRAMME

C3.1.5.1 Time for Completion

Time is of the essence for this contract. The Tenderer shall state the time in calendar months required by him/her to complete the Works. Tenderers offering early completion dates will generally be more favourably received, other things being equal.

C3.1.5.2 Tenderer's Programme

The Tenderer shall attach a preliminary programme indicating each portion of the works. The proposed order and rate of progress of the various construction activities shall be consistent with, and in support, of his time required for completion.

C3.1.5.3 Contractor's Programme

After award of the Contract, the Contractor shall submit a detailed programme to the Engineer for approval. The Engineer, may from time to time during the contract, require this programme to be amended in the interest of the project, and such amended and approved programme shall be adhered to rigidly.

Arrangements will be necessary to enable the mechanical and electrical contractor to commence with the design of the pump station in advance.

All costs for co-ordination with the mechanical and electrical contractor during building in or mechanical equipment and laying of electrical cables shall be covered by the applicable rates. No separate payment will be made for this.

The Contractor shall use excavation methods, which will prevent damage to existing structures and pipe work. Any cost for the repair of damages due to the Contractor's activities shall be borne by the Contractor.

Sufficient photos of the existing infrastructure must be taken by the Contractor and handed to the Engineer before such operations commence. No payment will be made in this regard and it shall be deemed covered in the preliminary and general items.

The complication of the construction program and any amendments thereto during the course of construction shall be at the cost of the Contractor and shall not be measured elsewhere in this contract.

C3.1.6 SITE FACILITIES AVAILABLE

C3.1.6.1 Water and Electricity Supply

The Contractor shall make his own arrangements for the supply and distribution of water and power.

C3.1.6.2 Location of Contractor's Camp and Depots

The Employer, in conjunction with the Engineer, will allocate a suitable area to the Contractors for the erection of temporary site offices and for storing materials.

C3.1.6.3 Sources of Construction Materials

Materials for layer works shall be selected from the material excavated from the site. If the existing materials is not of the required standard, suitable material will be imported from the existing borrow pit located on site. All construction material must be found, selected and supplied by the Contractor him/herself and approved by the Engineer. **All pipes and fitting material etc. used under this contract shall be SANS approved.**

C3.1.7 SITE FACILITIES REQUIRED

No existing facilities are available. All the necessary site facilities shall be provided and maintained by the Contractor. The requirements regarding notice boards, laboratories, accommodation and survey equipment for use by the Engineer. etc. are set out in sections PSA and PSAB of the project specification.

C3.1.7.1 Temporary Offices and Storage Sheds

The Contractor shall provide, erect, maintain and remove on completion of the Contract, ample temporary offices and sheds for the proper storage of perishable materials and for the use of his workmen. An office approximately 4m x 3m in size with a desk and 10 chairs is to be provided for the purpose of holding site meetings.

C3.1.7.2 Laboratory Facilities

No laboratory, testing or storage facilities are available from the Employer. The Contractor must make his own arrangements and provide all facilities which must be acceptable to the Engineer for all testing required. Refer also to Clause PSA 4.1

C3.1.7.3 Ablution and Latrine Facilities

No separate sanitation facilities for the specific use of the Engineer or his staff need be provided. The Contractor shall provide and maintain adequate and approved temporary ablution and latrine facilities for his workmen on site and remove on completion

C3.1.7.4 Telephone Facilities

No telephone facilities are available from the Employer. The Contractor is advised to establish his/her own communication facilities from the site to his/her outside organizations.

C3.1.7.5 Accommodation for the Engineer

A separate office is required for the specific use of the Engineer.

C3.1.8 FEATURES REQUIRING SPECIAL ATTENTION**C3.1.8.1 Existing Services**

There is limited data on the existing services; neither the Employer nor the Engineer will accept the responsibility for the accuracy or for any omission that may have been made.

The Contractor shall take all reasonable steps to protect any existing works against damage which may arise as a result of his operations on the site. The Contractor shall acquaint himself with all existing works. Before any excavation is commenced the Contractor shall submit to the owners of such works plans showing the extent of the proposed excavations together with a programme giving approximate dates on which excavations will be commenced, and shall where possible, obtain from the owners plans showing the position of all existing works.

Where the Contractor anticipates that it will be virtually impossible for him/her to carry out the work without causing damage to existing services or works, and the Engineer in his discretion feels such damage is likely to occur, the Contractor shall make arrangements with the authority concerned to temporarily remove, deviate, protect or suspend the work or service concerned and pay the costs incurred, which shall be reimbursed to the Contractor.

The Contractor shall be responsible for the proper consolidation of the ground under and around any exposed mains, cables, valves, stopcock boxes and the like. The uncovering of boxes and covers that may become buried during excavation or refilling operation will be at the expense of the Contractor.

When crossing under or running parallel to poles supporting electrical services, they shall be sustained securely in place until the work is complete and shall then be made safe as before.

Where any existing services are crossed or temporarily removed, the Contractor shall be responsible for the repair and/or reinstatement of the crossings to the satisfaction of the owners and the Engineer's Representative.

The Contractor shall be held responsible for damage to any existing works and any damage caused, including any claims, which arise as a result thereof. All such claims shall be borne by the Contractor, unless it is established by the Engineer that the Contractor exercised reasonable care and damage was unavoidable and that the notices were served timeously.

All damage done to existing works shall be immediately notified to the owners concerned and to the Engineer. If so directed by the Engineer, the positions of any existing work shall be changed by the Contractor to meet the requirements of the proposed work and the cost of such changes will be paid for as extra works.

C3.1.9 PRESERVATION OF THE SITE

The Contractor shall take the utmost care to prevent the starting of veld fires, and in the event of such fires starting, he shall immediately use all his labour force to limit and extinguish them.

The Contractor shall not permit the destruction of, or injury to, wild animals or bird life within the site of the works during the period of the contract. During the progress of the work and at the completion thereof the site is to be kept, and left, in a clean and orderly condition to the satisfaction of the Engineer. The Contractor shall at all times store materials and equipment for which he is responsible in an orderly manner and shall keep the premises free from debris and obstruction. Only trees marked and indicated by the Engineer may be removed.

C3.1.10 KEY PERSONNEL

The Contractor shall furnish the Engineer with a list of addresses and telephone numbers of key personnel in the Contractor's organization who may be contacted in an emergency both during and outside the office.

C3.1.11 SAFETY OF WORKMEN

The safe conduct of the Works shall be a primary consideration and the entire Works (until completion or termination of the contract) shall be carried out in conformity with the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) and all other applicable statutory regulations and requirements. Tenderers must price their tenders accordingly.

Particular attention is drawn to the following:

- If the Contractor has more than 20 employees, a health and safety representative (or representatives) must be designated.
- a) The Contractor is responsible for the compliance with the Act by all his/her subcontractors, whether or not nominated and/or approved by the Employer.
- b) The Contractor accepts sole responsibility for compliance with the Relevant duties, obligations and prohibitions by the Act, and expressly absolved the Employer and the Employer's consulting engineer's of responsibility for compliance with the Act in respect of work included in the contract
- c) The Contractor shall be obliged to report forthwith to the Employer any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the Act pursuant to work performed on behalf of the Employer.

The Contractor shall provide and maintain in readiness on the Site, all equipment and materials necessary to render first aid in case of accidents or other emergencies. The Contractor shall also assign to the Works and designate for this purpose, trained employees who are able to render first aid.

C3.1.12 SITE MEETINGS

The Engineer shall hold regular site meetings and keep and circulate minutes. The Contractor shall attend and shall ensure that all sub-contractors are represented when required by the Engineer.

C3.1.13 NOTICE TO THE ENGINEER

Apart from the specific notice periods called for in the Contract Documents, the Contractor shall give the Engineer 48 hours' notice of any work requiring inspection by the Engineer. No further subsequent work dependent on such approval may be undertaken until confirmation of such receipt by the Engineer has been received.

C3.1.14 USE OF DEFECTIVE WORKS

Should any of the works be found to be not in accordance with the Contract, the Client shall have the right to use such defective works until the Contractor shall have rectified the defect or replaced the defective works with works complying with the Contract, without prejudice to any of the Client's rights under the Contract and without incurring any obligation in respect of the use of the defective works.

C3.1.15 SANS 1200 SERIES STANDARDIZED SPECIFICATIONS

The Contractor shall provide onsite a copy of the relevant sections of both SANS 1200 Series Standardized Specification and the related 0120 Code of Practice.

C3.1.16 PRIME COST ITEMS AND PROVISIONAL SUMS

In cases of any provisional sum set out in the Schedule of Quantities for work which has not been specified or scheduled in detail when the contract is entered into, where work to which the provisional sum relates has been ordered by the Engineer and such work is: -

- a) Executed by the Contractor, it shall be valued in accordance with Clause 6.6 of the General Conditions of Contract 2015 3RD Edition,
- b) Executed by a nominated Sub-Contractor and paid for by the Contractor, the later shall be reimbursed the sum or sums he actually paid to the Sub-Contractor plus either: -
 - i) A commission of 10% (ten percent) on the sum or sums actually paid to the Sub-Contractor, irrespective of by whom payment is made to the Sub-Contractor, or
 - ii) If the Contractor shall have added to the provisional sum in question, a sum in respect of charges and profits, a sum in the same proportion to the amount paid to the provisional sum.

Where sums are stated in the Schedule of Quantities to be provided to cover the prime cost (P.C.) prime for goods or materials to be supplied under the Contract, the amount to be therefore to the Contractor shall be the actual price paid by him in substitution for the prime cost sum, together with any charge included by the Contractor in his tender for labour, profit, carriage, establishment and other charges.

Expenditure in connection with provisional and prime cost sums and under the contingency allowances (if any) shall be solely at the discretion and discretion from the Contract Price. When required by the Engineer, the Contractor shall produce all invoices, vouchers and receipts in respect of payments made by him in connection with provisional or prime cost items.

C3.1.17 Labour-Intensive Works

All the relevant tasks/works shall be constructed using Labour-Intensive Construction Methods only

C3.1.18 Location of the works

The Project is situated in the Musina Local Municipality area of jurisdiction. The project area is located in Musina Town. The latitude and longitude of the township are shown in the table below:

Project GPS Locations			
No.	Settlement	Latitude	Longitude
1	Harper wastewater treatment plant	30°00'31.02"E	22°21'11.57"S
2	Harper booster pump station	30°00'33.25"E	22°20'54.59"S

C3.1.19 Temporary works

The Contractor shall provide, erect, maintain and remove on completion of the Contract, ample temporary offices and sheds for the proper storage of perishable materials and for the use of his workmen. An office approximately 4m x 3m in size with a desk and 10 chairs is to be provided for the purpose of holding site meetings.

C3.2 ENGINEERING**C3.2.1 Design**

a). The Employer is responsible for the complete design of:

- Refurbishment of the WWTW and sewage pump station for the settlement as listed under point C3.1.18 above;

b). The Contractor is responsible for the following:

- To provide all details necessary to assist the Engineer in the compilation of the "AS BUILT" drawings for the entire project.

C3.2.1.1 Employer's Design

The design of the Works was done on behalf of the Employer by professional Consulting Engineer.

C3.2.2: 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 Employer's Agent 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 Employer's agent 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 Employer's agent 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 Employer's Agent of any conflicting dimensions.

C3.2.3: LIST OF DRAWINGS

DRAWING NO	DESCRIPTION	REFERENCE NO.:
25007-03-H-00	LIST OF DRAWINGS	1-1
25007-03-H-01	NAME BOARD	1-1
25007-03-H-02	GENERAL LAYOUT	1-2
25007-03-H-03	INLET WORKS	1-1
25007-03-H-04	WASTEWATER TREATMENT PROCESS PROFILE	1-1
25007-03-H-05	CHLORINE DOSAGE SYSTEM	1-1
25007-03-H-06	BOOSTER PUMP STATION	1-1
25007-03-H-07	STAFF ACCOMMODATION	1-1
25007-03-H-08	OFFICE BUILDING	1-1
25007-03-H-09	GUARD HOUSE	1-1
25007-03-H-10	SECURITY FENCE	1-1

C3.2.4 DESIGN

1. The Employer is responsible for the design of the permanent Works as reflected in the Contract Documents unless otherwise stated.
2. The Contractor is responsible for the design of the temporary Works (if applicable) and their compatibility with the permanent Works.
3. The Contractor shall supply all details necessary to assist the Engineer in the compilation of the record drawings.

C3.2.5 EMPLOYER'S DESIGN

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

C3.2.6 CONTRACTOR'S DESIGN

Where the Contractor is to supply the design of designated parts of the permanent Works or temporary.

C3.3 PROCUREMENT**C 3.3.1 PREFERENTIAL PROCUREMENT PROCEDURES**

The Municipality shall adjudicate and award bids in accordance with the Supply Chain Management Regulations, Vhembe District Municipality Supply Chain Management Policy (on request from Municipality), and other applicable legislations

C 3.3.2 SUBCONTRACTING (COMMUNITY BASED SUBCONTRACTORS - CBS)

The commitment of the Employer to Government Policy concerning the empowerment of the CBS shall be noted and adhered to by the main Contractor.

It is the intention of the Client that the minimum targeted participation goal for the local Sub-Contractors is for but not limited to the full value of Sub-Contracting works identified by the Employer as covered in the Bill of Quantities. The onus is upon the main Contractor to handle and manage the procurement process of the Sub-Contractors and once appointed, should be dealt with in accordance with the provisions of Clause 4.4 of the General Conditions of Contract 2015.

The identified scope of work by the Employer includes but not limited to the following:

- Cable Trenching;
- Construction of chambers;
- Any other task identified on site and approved by the Employer's Agent on site.

The minimum requirements for selection of the targeted enterprise sub-Contractors are as follows:

1. Valid CK registration;
2. Certified SA ID copies of owners;
3. Active CIDB membership: Grading to commensurate with the value and specialization of the work to be allocated;
4. Valid Tax clearance certificate;
5. COIDA certificate;
6. Company Profile including similar experience and skilled personnel CVs;
7. Health and Safety Plan;
8. Proof of locality;
9. A qualified plumber with at least 3 years of experience;

The Contractor is:

to enter into Contract with any (nominated, selected) Sub-Contractor(s) in accordance with the requirements of Clause 4.4 in the General Conditions of Contract for Civil engineering Works (2015), 3rd edition. The number of sub-Contractor(s) will be determined by the main Contractor depending on the Sub-Contracting Scope of Work and the amount of work that is to be carried out under this Contract as outlined above and in the Bill of Quantities.

- a) Required to utilise local Sub-Contractors (or regional if he fails to find suitable Sub-Contractors from within the project locality)
- b) Responsible for all work executed (including **QUALITY, CONTRACTUAL LIABILITIES**) on his behalf or under his supervision and/or management by all sub-Contractors, including nominated or selected sub-Contractors.

Note:

- **Local** Sub-Contractors are Sub-Contractors from within the project suburb or ward.
- **Regional** Sub-Contractors are Sub-Contractors from within the region as per the Vhembe District Municipality demarcation of the regions;
- **CBS** refers to Community Based Sub-Contractors;

The Contractor shall be expected to enter into a Contract with the nominated or selected Sub-Contractor(s) in accordance with the requirements of Clause 4.4 the General Conditions of Contract. The Employer must be supplied with a copy of the Contract /agreement for records.

NOTA BENE: The Employer's Agent shall not negotiate directly with sub-Contractors and all problems relating to programming, workmanship, etc., as they are matters between the Contractor and his sub-Contractors.

In the execution of the Sub-Contract Work, the Contractor shall ensure that the Sub-Contractor(s) comply with all relevant legislation and regulations including, but not confined to, the Occupational Health and Safety Act. The Contractor hereby indemnifies the Employer against any loss, damage, or claim for Sub-Contract Works set out for this specific project arising out of the former's failure to comply with instructions issued to him in regard to these requirements.

C 3.3.2.1 PERFORMANCE AND EXECUTION OF THE SUB-CONTRACT WORK

The main Contractor must ensure that his Sub-Contractors shall supply sufficient, suitable resources (e.g. equipment, labour, material) to execute all the Sub-Contract Work including the portion identified by the Employer as outlined in the Scope of Work and Bill of Quantities.

The Contractor shall also ensure that the Sub-Contractor(s) shall execute the Sub-Contract Work in accordance with the Scope of Work and Programme to the reasonable satisfaction of the Employer.

C 3.3.2.2 QUALITY OF THE SUBCONTRACT WORK

In accordance with the requirements of Clause 4.4 in the General Conditions of Contract for Civil engineering Works (2015), 3rd edition, it is the responsibility of the Contractor to ensure that the Sub-Contractor shall be capable of executing the Sub-Contract Work efficiently and in accordance with the Scope of Work.

C 3.3.2.3 LAWS AND REGULATIONS

The Contractor shall ensure that the Sub-Contractor(s) complies with the paying of all amounts due in respect of his employees and himself in terms of all relevant legislation and regulations including, but not confined to the following:

- Income Tax Act, the
- Compensation for Occupational Injuries and Diseases Act,
- Unemployment Insurance Act,

- Basic Conditions of Employment Act,
- Occupational Health and Safety Act Construction Regulations

C 3.3.2.4 RESOURCES TO COMPLETE SUB-CONTRACT WORK

Although it is preferred by Employer's Agent that the Contractor ensure that the Sub-Contractor(s) supply all required resources such as labourers, equipment, hand tools, power-driven tools if need be, which are required by him for the execution of the Sub-Contract Work, however the onus is upon the Contractor to determine the extent of resources the Sub-Contractor shall supply to ensure that the works are completed in time. The agreement between the Contractor and Sub-Contractor is the Contractor's responsibility and Employer's Agent is indemnified from any agreements entered between Contractor and his Sub-Contractor (s)

C 3.3.2.5 PRICING

Sub-contracting work will be allocated based on the specialty of the tasks and the relevant CIDB grading of the sub-contractor.

C 3.3.2.6 PAYMENT

The Contractor shall ensure that sub-Contractor(s) are paid within stipulated time as per the Agreement with the Sub-Contract failure which the Contractor can be reported to the Employers' Supply Chain Department and may prejudice his future employment with The Client.

C 3.3.2.7 RETENTION MONIES

The Employer will deduct Retention money for the overall works including the Sub-Contract work at the percentage stated in the Contract Data.

C 3.3.2.8 RESOLUTION OF DISPUTES

Should any dispute between the Contractor and the Sub-Contract arise out of the provisions of the Sub-Contract, or the execution of the Sub-Contract Work, every effort shall be made by the Parties to resolve the matter themselves without the intervention of the Employer. The agreement signed between the Contractor and sub-Contractor should state dispute resolution procedure.

C3.4 CONSTRUCTION**C3.4.1 Works specifications**

The applicable “Standardized specifications” shall be the “SANS 1200 Standardized specifications”, read together with the Particular Specifications.

Bidders, Contractors and Sub-Contractors shall obtain their own copies of the document “applicable SANS 1200 Standardized specifications”, for tendering purposes and for use for the duration of the Contract from the Vhembe District Municipality and shall bear all expenses in this regard.

The Standard Specifications have been written to cover all types of municipal civil engineering works and it may therefore cover work not applicable to this Contract.

The Particular Specifications together with the Drawings and Bill of Quantities clearly indicate the sections of the Standard Specifications which apply to this Contract.

C3.4.1.1 Amendments to the Standard Specifications

PSA 1200 A: General
PSC 1200 C: Clearance
PSA 1200 DB: Earthworks (Trenches)
PSD 1200 D: Earthworks
PSLB 1200 LB: Bedding
PSL 1200 LD: Sewer Pipelines
PSGA 1200 GA: Concrete (Small works)
PSG 1200 G: Concrete (Structural)
PSH 1200 H: Structural Steelwork
PSHC 1200 HC: Corrosion Protection of Structural Steelwork
PSHC 1200 SW: Fence

C3.4.1.2 Particular Specifications

The following additional Specifications for work not covered by the SANS 1200 Standardized

Civil and Mechanical
DWS 1110 : construction of pipelines
DWS 1130 : steel pipes
DWS 1131 : lining and coating of steel pipes
DWS 2510 : valves
DWS 9900 : corrosion protection

Mechanical
SANS: 62, 200, 4427, 719, 936/7, 989/992, 1034, 1062, 1123, 1186, 1200H, 1217, 1465, 1700, 1804, 10044, 10104, 10160, 10108, 50025, 60034-5, 61241
BS: 970, 1400, 1452, 1490, 2789, 3100, 3790, 4515, 4872, 7854, 664, 191, 936, 1432, 135
BS EN: 681, 1092
BS EN ISO: 23936
ISO: Sa3, 4184, 8501, 10816

Electrical
SANS 97
SANS 1574
SANS 1765
SANS 1973-3
SANS 60439-1
SANS 60439-3
SANS 10114-1
SANS 10114-2763
SANS 10198-13
SANS 05 -Transport, handling, and installation of electrical cables. SANS 10142-1:2006 -The Wiring of Premises Part 1: Low-Voltage Installations

SABS IEC 60204-1	-Safety of machinery
SABS IEC 60384	- Electromagnetic compatibility.
SANS 10292	-Earthing of LV distribution systems
SANS 60947	-Low-voltage switchgear and control gear
SANS 1085	-Wall outlet boxes for the enclosure of electrical accessories-
SANS 1239	-Plugs, socket-outlets, and couplers for industrial purposes
SANS 1279	-Floodlighting luminaires
SANS 10114-1	-Artificial lighting of interiors
SANS 10114-2	-Interior lighting part 2, emergency lighting
SANS 475	-Luminaires for interior lighting, street lighting and flood lighting, performance requirements
IEC 61643	-Low voltage surge protective devices
SANS 164	-All switched socket-outlets shall be suitable for mounting in 100x 100 x 50mm or 100 x 50 x 50mm boxes.
SANS 1663	- All switches shall be suitable for mounting in 100 x 50 x 50mm. boxes.

Particular Specifications are also included hereunder:

PSB 1 Standard Specifications for Mechanical Works (Incl. General Works)
 PSB 2 Particular Mechanical Specifications
 PLDW Particular Specifications for Dewatering and Desludging
 PLLN Particular Specifications for Geomembrane Lining
 PLM Particular Specifications for Electrical Works
 PLSS Particular Specifications for Roofing Sheets and Side Cladding
 PLRA Particular Specifications for Removal of Asbestos Sheets
 PLRC Particular Specification for Repairs of Concrete Works
 PSF Particular Specification: Social Facilitation

Section C3.6 covers references to the Particular Specifications in the Standard Specifications as well as variations and additions to the Standard Specifications.

C3.4.1.3 Variations and Additions to the SANS 1200 Standardized Specifications

Variations and additions to the following SANS 1200 Standardized Specifications listed in C3.4.1 are given in section C3.4.6.

C3.4.2 SITE FACILITIES

1. Water Supply

Potable water supply is available for use by the contractor if granted permission by the municipality. The current tariffs applicable are available from the water and sanitation division. The Municipality can only draw water from fire hydrants specified by the municipality in exceptional circumstances and then only after written authority had been granted. When permission is granted, the water must be drawn through a metered stand pipe issued by the water and sanitation division.

The Contractor shall cease to operate until other arrangements have been made for the supply of water. No claims for delay so caused will be considered.

No warranty is offered or given by the Employer that the existing available reticulated water supply will necessarily be adequate for the Contractor's purposes nor that such supply is in any way guaranteed.

All charges as may be levied by the responsible water supply authority in respect of water consumed by the Contractor shall be for the Contractor's account and payment to the Contractor in respect thereof shall, in accordance with the provisions of subclause C3.4.2.2(b), be deemed to be included in the sums bided by the Contractor for the various Preliminary and General items listed in the Schedule of Quantities, as well as in the rates bided by the Contractor for the various other items listed in the Schedule of Quantities which require the consumption of water.

The Contractor shall, when reasonably required by the Engineer, produce documentary proof that all amounts as may have become due and payable by the Contractor to the responsible water authority have been promptly paid in full.

2. Electricity power Supply

The Contractor shall make his own arrangements for the supply of electricity power to suit his own and the Employer's Agent's requirements and operations. The cost of providing connections any transformer sub-stations and switch gear, generators fuel and/or overhead power lines or underground cables required to supply the electric power shall be included in the rates entered in the Schedule. The cost of electric power consumption for construction, rock drilling. Machinery operations a lighting, ventilation and domestic use are to be included in the rates in the schedule of Quantities for the various construction and operations.

3. Access Roads

Where the locality of works requires it, the Contractor shall grade or construct and keep in good and constant repair, temporary access roads connecting public roads in the vicinity with the works. Such roads must be of a sufficiently high standard for reliable access of heavy transport vehicle in all weathers and shall communicate with all parts of the works.

4. Use of Site

All notice boards. Sign boards and advertisement at the site shall be subject to the Employer's Agents approval. The Contractor shall take all precautions to preserve trees other than those which, of necessity, must be removed to fulfil the Contract.

The Contractor shall maintain the site in a clean, orderly and sanitary condition and shall take all necessary steps and precautions to prevent the pollution of the surrounding area by his employees or animals in any way. These steps and precautions shall be to the satisfaction of the Employer's Agent and Medical Officer of Health of Madibeng.

5. Precautions against Nuisance

The Contractor's attention is drawn to the fact that operations are being conducted in a semi-urban area and in the presence of traffic. Special precautions must be taken to protect the public and to prevent unnecessary noise, dust or other nuisance.

Plant used on the works shall be as efficiently silenced as possible and noisy operations will be permitted only between the hours of 7H00 am and 5H00 pm. Any work outside normal hours will be permitted only on the written authority of the Employer's Agent.

Whenever machinery is excavating or loading material which is liable to form a dust nuisance, an effective method of spraying water over the cut area and loaded material shall be installed. Tarpaulins shall be provided to cover trucks and prevent dust blowing from loads during transport.

Any rock or debris falling from trucks on the roads in use by the public shall be removed immediately. Precautions shall be taken to prevent fouling of public roads of completed construction by trucks transporting muddy material. The Employer's Agent may order the Contractor continuously to broom off and clean roads where the mud tracking of vehicles or falling debris may constitute a danger to the travelling public.

6. Sanitary Accommodation

The Contractor shall provide, maintain, move to position as required and finally remove proper sanitary accommodation at each work. Front sanitary accommodation shall be properly screened and its use strictly enforced. The situation of sanitary accommodation prescribed in terms of the Sanitary General By-Laws shall be approved by the Employer's Agent as being convenient for the person whose use it is intended.

The sanitary accommodation provided must be adequately ventilated. Properly disinfected and kept in a thoroughly clean condition at all times.

The Contractor shall make arrangements for the provision of the sewer connection in the case of water closets or the removal of pails in the case of pail closets.

The Contractor shall bear all costs associated with the provision of sanitary accommodation. Compensation for these costs will be made under the relevant item the schedule of Quantities.

7. Work in Servitudes

The Contractor shall give 7 days' advance notice to both the Employer's Agent and the property owner of his intention to commence work in servitude. The Contractor shall not permit his workmen and labourers to use the servitude as a temporary right-of-way and shall carry out the expeditiously and with minimum inconvenience to the occupiers and to owners of adjacent property.

The Contractor shall take all necessary precautions for the protection of person's livestock, buildings and property. The soil shall be kept segregated and all gardens, fences, path etc. shall be reinstated to their former condition.

Where acquisition of servitude has been finalized it may not be possible to obtain continuity of the work. The Contractor will be required temporarily to omit such sections until instructed that the work may proceed.

No extra payment will be made to the Contractor should it be necessary to omit sections and return to them later. It is not intended, however, that the Contractor should be called upon to return to the Site after all other sections of the Contract have been completed and the Contractor has removed his plant and equipment.

Trees removed in servitude shall remain the property of the stand owners if required by them.

8. Access to Premises

The Contractor shall maintain adequate access to all public and private properties at all times unless otherwise sanctioned by the Employer's Agent. Details of the proposed methods of providing access shall be submitted to the Employer's Agent for approval before such access is restricted. Any claims arising from impeded access shall be wholly the responsibility of the Contractor.

Provision shall be made to allow sanitary services to stand to be unimpeded.

Where necessary to permit access or egress, the Contractor shall provide for the laying of planks or other excavated and filled works or even concrete or asphalted surfaces in order to protect the work from damage.

Any temporary wooden bridges shall be provided with suitable tubular or other hand rail and horizontal member shall be placed at 0,3m, 0,9m and 1,2m above the level of the boards.

Vehicular access shall be maintained to properties at the end of each day's work unless the Contractor as made alternative arrangement with the owners.

9. Waterways

Free waterways shall be maintained in gutter, drains streams. Etc. and existing conditions shall not be changed by deposition spoil in waterways or by diverting water into private property

The Contractor shall settle all claims and make good any damage at his own expense should flooding of public property occur through waterways being obstructed or diverted as a result of his operations.

10. Permits and wayleave

The Contractor shall be responsible to obtain all the wayleave required under this Contract. A separate payment item has been included under Section 1200 A of the Schedule of Quantities to compensate the Contractor for all his expenses to obtain the wayleave.

The wayleave to be obtained by the Contractor consists mainly of the following:

C3.4.3 FEATURES REQUIRING SPECIAL ATTENTION

(a) Site maintenance

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

- **Testing and quality control**

I. CONTRACTOR TO ENGAGE SERVICES OF AN INDEPENDENT LABORATORY

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

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

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

The test results for tests conducted each month shall be submitted together with the interim payment certificate for that month. Failure to conduct the tests as per the specifications will result in non-payment of the Contractor's claim until such tests are conducted and results certified to have met requirements.

The handling, storage, transport, and erection of equipment, machinery, and materials shall be strictly in accordance with the requirements of the supplier and/or manufacturer. All materials shall be new and of the best quality available unless otherwise specified. They must function satisfactorily under prevailing climate and weather conditions at the place of installations.

For the purposes of this clause, an "independent laboratory" shall mean an "approved laboratory" (as defined in subclause PSA 7.2) which is not under the management or control of the Contractor and in which the Contractor has no financial interest, nor which has any control or financial interest in the Contractor.

II. ADDITIONAL TESTING REQUIRED BY THE ENGINEER

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

III. COSTS OF TESTING

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

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

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

b) Additional tests required by the Engineer

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

c) Sub-Contract's

All matters pertaining to Sub-Contract's (including Nominated Sub-Contract's) and the work executed by them shall be dealt with directly between the Employer's Agent and the Contractor in the context of all Sub-Contract work being an integral part of the Works for which the Contractor is responsible. The Employer must be supplied with a copy of the contract/agreement for records.

The Engineer will not liaise directly with any Sub-Contract's nor will he issue instructions concerning the Sub-Contract works directly to any Sub-Contract.

All matters arising from the Sub-Contract agreements shall be dealt with directly between the Contractor and the Sub-Contract's and the Employer's Agent will not become involved.

d) Opening up and closing down of designated borrow pits

Measurement and payment for opening up and closing down designated borrow pits, including removing and stockpiling overburden and restoring the Site, shall be made under item 8.3.4 of SANS 1200 D. This item applies to all borrow material required under this Contract.

The requirements of subclause 5.2.2.2 of SANS 1200 D regarding the opening up, maintenance and closing down of borrow pits shall be adhered to.

C3.4.4 PLANT AND CONSTRUCTION EQUIPMENT

The Contractor is encouraged to hire plant and construction equipment from local community where possible.

All items of plant used on the works shall be approved, morden, efficient plant, well suited to the purpose for which the Contractor uses them and shall be properly maintained items of plant which leak oil or which, in the opinion of the Employer's Agent's generate excessive noise, smoke, or other nuisance shall be removed from the works. The Employer's Agent's decision in this respect shall be final and binding upon the Contractor

All vehicles used on the works are to be sound mechanical condition and shall conform to and be operated in accordance with the Limpopo Provincial Ordinance and the Limpopo Provincial Traffic regulations. All vehicles must be fully insured against accident or loss including third party risk and the Contractor shall produce evidence of this if required by the Employer's Agent.

The Contractor shall be deemed to have established the extent to which mechanical plant can be used for excavating and refilling before the submission of its tender. The Employer's Agent's authority to use mechanical plant will not be unreasonably withheld, but if in the Employer's Agent's opinion, circumstances exist which make it desirable that the use of plant should be suspended either temporarily

or permanently, the Contractor shall change the method of performing the work affected at his own cost and he shall be deemed to have no cause for claim if any order issued by the Employer's Agent results in the mechanical plant having to stand idle for a period of any duration whatsoever or having to be removed.

In particular, where it is impossible due to proximity to existing structures or services to excavate except by hand methods then in such cases it shall be deemed reasonable for the purpose of this clause for the Employer's Agent to withhold authority to use mechanical plant.

C3.4.4.1 Facilities provided by the Contractor

a) Facilities for the Engineer

The Contractor shall provide on the Site, for the duration of the Contract and for the exclusive use of the Engineer and/or his Representative (as applicable), the various facilities described hereunder. All such facilities shall be provided promptly on the commencement of the Contract and failure on the part of the Contractor to provide any facility required in terms of this specification shall constitute grounds for the Engineer to withhold payment of the Contractor's bidden Preliminary and General items until the facility has been provided or restored as the case may be.

i). Office accommodation

The Contractor shall provide on the Site One office for the exclusive use of the Engineer. Such office shall comply with and be furnished in accordance with the requirements of subclause 3.2 of SANS 1200 AB. The Contractor shall maintain the office(s) in accordance with the requirements of subclause 5.2 of SANS 1200 AB. Such office accommodation shall be provided within the Contractor's site establishment facilities.

iii). Contract name boards

The Contractor shall provide, erect and maintain one Contract name board at such positions and locations as are directed by the Employer's Agent, in accordance with the requirements set out in SANS 1200 AB (as amended).

The Contractor shall before order or manufacturing any such Contract nameboard, obtain the Employer's Agent's written approval in respect of all names and wording to appear on the Contract nameboard.

iv). Survey equipment and assistants

• Survey equipment

The Contractor shall, in accordance with the requirements of SANS 1200 AB (as amended) provide the following survey equipment for the exclusive use of the Engineer and his staff:

- 1 upright reading automatic level with tripod.
- 1 metric levelling staff with protective cover bag.
- 6 ranging rods.
- 1 100 metre Stilon tape measure.
- 1 ± 2 kg hammer.
- 1 ground penetration radar equipment.

Whenever reasonably required by the Engineer, the Contractor shall, in accordance with the requirements of SANS 1200 AB (as amended), make available to the Engineer or his representative, the following additional survey equipment:

• Survey assistants

The Contractor shall, in accordance with the requirements of subclause 5.5 of SANS 1200 AB, make available to the Engineer, two (2) survey assistants.

vi). All computer hardware shall be provided complete with the requisite connecting cables and all interfacing devices and software necessary for its efficient operation as an integral system.

The following software shall be properly installed on the computer, and the original licence agreements and disks shall be provided to the Engineer for safekeeping:

- (a) Microsoft Windows 10
- (b) MS-Office business/ Microsoft 365
- (c) Laptop -i7;16GB RAM; 500GB; SSD or 1TB HDD
- (d) Internet connection (minimum 10mbps for both download and upload)
- (e) Printer with copying and scanning functions

All computer equipment provided shall be kept fully serviceable at all times by the Contractor. The Contractor shall have any defective equipment repaired or replaced at his own cost within 12 hours after notification by the Employer's Agent staff.

The Contractor shall further provide at his own cost, all paper and black ink cartridges and other consumables reasonably required by the Engineer.

vii). Electricity supply for the Engineer

All electricity supply to the Employer's Agent office(s) and laboratory (if applicable), whether provided by the Contractor by way of a reticulated supply from a local authority or other authorised electricity supply, or by way of on-site generators, shall be regulated by the Contractor to within limits such as to prevent damage due to fluctuations in the electrical current supply that may occur to any electrical plant and equipment provided by the Contractor or the Engineer.

The Contractor shall be liable for and pay to the Engineer on demand, all costs that the Engineer may incur in the repair or replacement of any electrical equipment provided by the Engineer on the Site. Reliance by the Contractor on the regulation of the electrical supply by the supplier or on current regulators fitted to generators shall not absolve the Contractor of his liabilities in terms of this Subclause and, where appropriate, the Contractor shall provide and install at his own cost, all such electrical current-regulating equipment as is necessary to prevent damage to the said equipment.

viii). Site instruction book

The Contractor shall keep a triplicate book for site instructions on the Site at all times.

ix). Housing for Employer's Agent Representative (Example only)

The Engineer will provide housing for the Employer's Agent Representative. The housing and the relevant services and local authority rates and charges shall be paid by the Contractor on the written instruction of the Engineer, from a Prime Cost Sum/Provisional Sum included in Section 1200 A of the Schedule of Quantities for this purpose.

The Contractor is entitled to a percentage of the value of each payment to the Engineer to cover his expenses in this regard. (See item PSA 8.6.)

C3.4.5 MATERIALS

C3.4.5.1 General

All material supplied shall be to SANS applicable specification as amended or where no such specification, to the approval of the Employer's Agent. Specification not contained in the document may be examined by arrangement at the water and sanitation Division. It will be required from each Contractor to supply proof of conformation to the relevant SANS specifications of all material envisaged to be used on the Contract to the Employer's Agent for his approval

C3.4.5.2 Storage

All materials shall be stored in storage areas which shall be agreed by Employer's Agent and shall be fenced with 1, 8 m high chain link fencing and a lockable gate. Pipes shall be stacked off the ground. Pipes shall be covered to prevent deterioration through ultra-violet attack.

C3.4.6 GENERAL MATTERS**1. Consumer Complaints**

Save in respect of the liability arising from clause 21, the Contractor's responsibility in respect of no water or poor pressure complaints arising out of the execution of the Contract shall be limited to ensuring that an adequate cold-water supply exists to the complainant's property.

2. Advertisement in the Media and Notifications to consumers

The Employer's Agent will arrange any media advertisement necessary for warning the public of any shut down of supply necessary, in his opinion, for the proper execution of the works. The Contractor must however, give at least 14 (fourteen) days' notice to the Employer's Agent of his requirements in the respect. Specifically, media advertisements will be arranged when the number of consumers affected by a shutdown is such that issuing notices to individual consumers as provided hereunder is impracticable. Planned interruptions of water supply shall only be permitted between 09h00 and 15h00 unless otherwise authorized in writing by the Employer's Agent.

The Contractor shall give all consumers affected at least 24 hours' notice in writing of his proposals in regard to every planned interruption of water supply necessary for the execution of his work. Failure to do will result in the suspension of work for a period as determined by the Employer's Agent.

The Contractor shall give written notice to all consumers adjacent to the planned route of work to be done. This notice shall be given well in advance of the starting date of construction. The notice will inform the residence that all grass, irrigation and valuable must be removed beforehand.

3. Use of Explosives

Explosiveness shall not be used without the written permission of the Employer's Agent. A procedure must be issued prior to the works for approval by the Employer's Agent.

C3.4.7 Construction Issues**1. Excavation, backfilling and reinstatement**

Excavation, backfilling and reinstatement shall be carried out in accordance with the project specification and the standard specification for municipal civil engineering work all excavations shall be performed in terms of the construction Regulation 2014 of the occupational Health and safety Act.

2. Clearing and Grubbing

If any paving is to be removed to place the new water pipeline in position the rate for the breaking out and removal of the paving shall be claimed under 8.3.2.1 section 1200D in the Schedule of Quantities. No clearing and grubbing will be paid where the new pipelines are to be laid on the sidewalk (area between the road and the erf boundary fence)

It must be noticed that the area between the erf boundary and the road must be clean, with no stones or rocks which can damage any machine used to cut the lawn.

3. Excavations**a) Trenches - General**

Trenches shall be back filled level with adjacent surfaces immediately after completion of pipe laying. Should pipe laying not be complete before is due to cease for the day the Employer's agent shall be entitled to instruct the Contractor to backfill the trench and re-excavate it the following morning in order to complete pipe laying. The cost of the above shall be included in the Contractor's rates for excavation.

Pads shall be fitted to the outriggers of excavating plant to prevent damage to road surface. Damage to any surfaces beyond the trench widths specified shall be repaired at the Contractor's expense.

b) Trenches Across Roads

Even if a trenching machine is used road surfaces shall first be cut with a diamond tipped saw or other approved method. After the trench has been backfilled and compacted the road surface has to be cut again, 200mm from the edge on both sides of the trench.

The length of premix cut shall be measured and paid for under the relevant item on the bill. Section 1200D as provided in the Schedule of Quantities. The complete closure of any road shall not be permitted without the written consent of the Employer's Agent.

During the time that the trenches have been backfilled and the time that the Municipality reinstates the road surfaces, the Contractor will be responsible for the maintenance on the road.

The trench will be backfilled above the selected material with G4 material in 150mm layers stabilized with 3% cement, compacted to 95% MOD AASHTO and paid for under relevant item on the bill. Section 1200D as provided in the Schedule of Quantities. No haulage will be paid separate but the rate for haulage must be included in 8.2.5 Section 1200LB.

c) Trenches – Paving and driveways act

The last 450mm of backfilling in the trench will be done with G4 material compacted to 95% MOD AASHTO payment will be in accordance with 8.3.21, Section 1200D; no haulage is payable.

d) Removal of Excavated Material

Excavated material shall not remain on the work site for more than 48 hours

The Contractor's scheduled rates shall cover the cost of complying with this restriction including inter alia the cost of removing off site to temporary and then returning to site, excavated material suitable for use as backfill or bedding. No haulage will be paid separately but the rate for haulage must be included in 8.2.5, Section 1200LB.

e) Maintenance of Excavations

Existing mains are in general located at a cover depth from 0,6m to 1,5m and excavation to at least this depth will be required for tie-ins etc.

The Contractor shall be solely and entirely responsible for maintaining excavations in a safe condition and this responsibility shall be in no way diminished by any instruction by the Employer's Agent to take additional or improved protected or precautionary measures.

It should be noted by Bidders that plastic tape is not regarded as adequate protection around excavations and its use for that purpose shall not be allowed.

Barricades with two (2) horizontal bars will be used. The top bar must be at least 1.2m high. Both bars must be chevron painted-red white. The rate must include full compensation for the moving and maintenance of all barricades for the duration of the Contract.

f) Classification For Excavation Purposes

The Engineer shall classify excavated materials as Soft Class and Rock will be measured individually as extra-over items.

TABLE 1: Classification of Materials

CLASSIFICATION	DESCRIPTION
Soft	All material other than rock

Rock	Material which cannot be economically fragmented and loosened for removal by hand implements and pneumatic tools, except by drilling and blasting or the use of rock breaking equipment.
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In the first instance, the classification shall be based on the descriptions given in Table 1. In the event of disagreement between the Contractor and the Engineer, the Engineer shall reclassify the material in accordance with relevant specifications and without being unreasonable to the Contractor. The decision of the Engineer on the classification shall then, subject to the provisions of the Contract, be final and binding.

The Contractor shall notify the Engineer of the presence of what he considers to be rock immediately upon discovery thereof. The Engineer will inspect the material and decide whether or not it warrants the use of pneumatic tools or rock breaking equipment. In the case of isolated boulders set in a soil matrix, the Engineer may order the Contractor to either widen the excavation or roll the boulders sideways or lift the boulders out from the trenches.

In the event that the Engineer decides that the use of pneumatic tools, rock breaking equipment, or blasting is necessary, he will classify the material accordingly and arrange for the quantity thereof to be measured. The Construction Manager will supply necessary pneumatic equipment and arrange for others to break up rock into manageable pieces.

g) Depth of Excavations

The minimum cover to new mains shall be 1 200mm.

h) Intermediate Material

Intermediate material will be classified as material where the use of pneumatic tools such as paving breakers before removal.

i) Hard Material

Hard material will be classified as material where mechanical plant, such as compressors and jack hammers or blasting is required.

4. Testing of Backfill Material

The compacted density of the backfill material shall be in accordance with section 5.7 of SANS 1200DB of the standard specification.

If the required compacted density cannot be achieved with the excavated material, G4 material will be imported and compacted to the required density for base layers. Payment will be made under 8.3.21, Section 1200D of the Standard Specification and no haulage will be paid separately, but the rate for haulage must be included in 8.2.5, Section 1200LB

The Contractor will be required to submit at least 3 lab tests for compaction, or as required by the Employer's Agent, per block completed and one per road crossing. No payment will be approved if the tests have not been included in the rates. No additional payment will be done for the compaction tests.

5. Reinstatement

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.

6. INSPECTION AT INTERMEDIATE STAGES OF CONSTRUCTION

The Contractor shall call for an inspection of the works at the following remediate stages of construction.

- a) After completion of the trench excavation and of the trench bottom, and before any pipe is laid
- b) After the selected backfill, material has been placed around the pipe; and before the remainder of the trench is backfilled.

Work shall not progress through the specified stages without the approval of the Employer's Agent or his representative on site.

Failure to comply with the provision of this clause shall result in the suspension of work for a period as determined by the Employer's Agent.

7. EXTENSION OF TIME DUE TO UNPREDICTABLE WEATHER CIRCUMSTANCES

Extension of time will not be considered for normal adverse weather conditions but only for abnormal rainfall or saturated conditions and will be calculated in accordance with Sub-Clause 5.12.2.2 method 1 of the special Conditions of Contract.

The factor $(N_w - N_n)$ shall be considered to represent a fair allowance for days during which rainfall exceeds 10 mm and the factor $(R_w - R_n)/x$ 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 N_n and R_n ."

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.

8. PIPE AND MANHOLE TESTS

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. The Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Employer's Agent. 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.

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by the Employer's Agent for acceptance control. However, before accepting any work, the Employer's Agent 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.

9. Replacement of Leads (Pipe Jacking)

G1 Trenchless Construction

A horizontal boring or auger machine shall be used for the installation of pipes under paved surfaces and road crossing where soil condition permits any plant used for the purpose of demonstrating whether trenchless construction is practical or not shall be in good order. Where soil conditions preclude the use of boring or auger machines under paved surfaces and road crossing. Leads shall be installed by open trenching.

Approval for open trenching must be obtained from the Employer's Agent under these circumstances' trenches shall be backfilled immediately after completion of pipe laying should pipe laying not be complete before work is due to cease for the day, the Employer's Agent shall be entitled to instruct the Constructor to backfill the trench and re-excavate it the following morning in order to complete pipe laying. The cost of the above shall be included in the Contractors rates for excavation.

If a trenching machine is used for road crossing. The road shall first be cut with a diamond tipped saw or other approved method, all trenches across the road shall be cut at right angles to the kerb. Damage to the road surface beyond the trench widths specified shall be repaired at the Contractors expense.

The length on premix cut shall be measured and paid for under item providing for in the schedule of quantities (refer to 8.3.2.1 Section 1200D).

C3.4.8 Contractor's Employees

1. MINIMUM EMPLOYMENT CONDITIONS FOR CONVENTIONAL CONSTRUCTION WORKS

Contractors shall comply with the Basic Conditions of Employment Act (Act No 75 of 1997).

As a determination has not been made in terms of the aforesaid Act for the building sector, the minimum employment conditions which will apply to this Contract shall be guided by the Sectoral Determination: Civil Engineering Sector published in the Government Gazette dated 2 March 2001.

The following minimum conditions shall apply to this Contract and Contractors shall include such conditions in employment Contracts.

1.1. Employment Contracts

The Contractor shall enter into an employment Contract with every one of his/her employees, including short-term Contracts i.e., Contracts in which employment commencement and employment termination dates are specified. Short-term employment Contracts will also apply an employee employed for only one day (see proforma Contract on Annexure 1).

1.2. Normal working hours

Normal working hours are from 07:00 to 17:00 from Monday to Friday. A tea break is taken from 09:00 to 09:15 and lunch from 12:30 to 13:00.

Actual hours to work and be paid for is 9 hours per day. If a lunch break of one (1) hour is taken then the normal working day will be as follow:

Morning work sessions from 07:00 to 12:00, lunch break from 12:00 to 13:00, and afternoon sessions from 13:00 to 17:00.

1.3. Minimum wages

Minimum wages shall be according to the Government Gazetted rates for the Department of Labour. For a full day's work, the hourly rate shall be multiplied by 9. Normal 5-day week hours of work shall be 45 hours and the wage calculated according to the applicable hourly rate.

Overtime pay shall be 1.5 times the ordinary wage.

An employee shall be paid monthly.

1.4. Short time (excluding short time due to inclement weather)

If for reasons, which may be ascribed to the employee, e.g., arriving late for work or taking an afternoon off, the hours not worked shall be deducted from the daily wage calculation.

1.5. Short time resulting from inclement weather

- i. If the Contractor informs his/her employees that no work will be done the following day due to inclement weather, no payment will be due to the employee for such a day.
- ii. If the Contractor has not informed his/her employees that no work will be done due to inclement weather and no work or less than four (4) hours of work is possible during a day, the Contractor must pay the employee for four (4) hours of work. If more than four (4) hours of work is done, the Contractor shall pay the employee for the number of hours worked.

1.6. Vacation leave

If an employee has been in full time employment for more than four (4) months, he/she shall be entitled to 1 day's paid leave for every seventeen (17) days the employee worked or was entitled to payment.

1.7. Family responsibility leave

If an employee has been in full time employment for more than four (4) months, he/she shall be entitled to three days paid leave in a leave cycle of thirty-six (36) months of employment:

- i. When the employee's child is born;
- ii. When the employee's child is sick;
- iii. In the event of death of the employee's spouse or life partner, parent, grandparent, child or grandchild.

The employee shall provide the required proof to the Contractor of the event, failing which the leave shall be unpaid leave

1.8. Maternity leave

At least four (4) months unpaid leave.

1.9. Sick leave

The employee shall be entitled to one (1) day's paid sick leave of normal wages for every twenty-six (26) days worked.

If an employee is absent for three (3) or more consecutive days, the employee shall provide a sick certificate from a registered medical practitioner to qualify for sick leave payment. If such certificate is not provided, no sick leave payment will be due to the employee.

1.10. Piece work

Irrespective of the quantity of work done under a piece work system during a working week, the employee shall be entitled to a minimum of a week's wages determined as if no piece work applied.

The Contractor or employee may terminate an employment Contract by giving notice of termination of not less than:

- i. On short period Contract s i.e., a Contract which states from which date work employment commences and on which day employment terminates, the terms of the employment Contract shall apply;
 - a) One week if employee has been employed for four (4) weeks or less, unless it is a short-term project;
- ii. Two (2) weeks if employee has been employed for more than four (4) weeks but not more than one (1) year;
- iii. Four (4) weeks if employee has been employed for more than one year.

2. EMPLOYMENT CONDITIONS FOR LABOUR INTENSIVE WORKS AND CONSTRUCTION

The Ministerial Determination, Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice N° R63 of 25 January 2002, as reproduced below, shall apply to works described in scope of work as being labour intensive and which are undertaken by unskilled or semi-skilled workers.

This clause contains the standard terms and conditions for workers employed in elementary occupations on a Special Public Works Programme (EPWP). These terms and conditions do NOT apply

to persons employed in the supervision and management of a EPWP.

- **Terminology**

- a) "Department" means any department of the State, implementing agent or Contractor;
- b) "Employer" means any department, implementing agency or Contractor that hires workers to work in elementary occupations on a EPWP;
- c) "Workers" means any person working in an elementary occupation on a EPWP;
- d) "Elementary occupation" means any occupation involving unskilled or semi-skilled work;
- e) "Management" means any person employed by a department or implementing agency to administer or execute an EPWP;
- f) "Task" means a fixed quantity of work;
- g) "Task-based work" means work in which a worker is paid a fixed rate for performing a task;
- h) "Task-rated worker" means a worker paid on the basis of the number of tasks completed;
- i) "Time-rated worker" means a worker paid on the basis of the length of time worked.

- **Terms of Work**

- 2.2.1 Workers on a EPWP are employed on a temporary basis.
- 2.2.2 A worker may NOT be employed for longer than 24 months in any five-year cycle on a EPWP.
- 3.1.1 Employment on a EPWP does not qualify as employment as a contributor for the purposes of the Unemployment Insurance ACT 30 of 1966.

- **Normal Hours of Work**

- 2.3.1 An employer may not set tasks or hours of work that require a worker to work:
 - a) more than forty hours in any week;
 - b) on more than five days in any week; and
 - c) for more than eight hours on any day.
- 2.2.4 An employer and worker may agree that a worker will work four days per week. The worker may then work up to ten hours per day.
- 2.2.5 A task-rated worker may not work more than a total of 55 hours in any week to complete the tasks allocated (based on a 40-hour week) to that worker.

2.4 Meal Breaks

- 2.4.1 A worker may not work for more than five hours without taking a meal break of at least thirty minutes duration.
- 2.4.2 An employer and worker may agree on longer meal breaks.
- 2.4.3 A worker may not work during a meal break. However, an employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An employer must take reasonable steps to ensure that a worker is relieved of his or her duties during the meal break.
- 2.4.4 A worker is not entitled to payment for the period of a meal break. However, a worker who is paid on the basis of time worked must be paid if the worker is required to work or to be available for work during the meal break.

2.5 Special Conditions for Security Guards

- 2.5.1 A security guard may work up to 55 hours per week and up to eleven hours per day.
- 2.5.2 A security guard who works more than ten hours per day must have a meal break of at least one hour or two breaks of at least 30 minutes each.

2.6 Daily Rest Period

Every worker is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

2.7 Weekly Rest Period

Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work ("emergency work").

2.8 Work on Sundays and Public Holidays

2.8.1 A worker may only work on a Sunday or public holiday to perform emergency or security work.

2.8.2 Work on Sundays is paid at the ordinary rate of pay.

2.8.3 A task-rated worker who works on a public holiday must be paid –

- (a) the worker's daily task rate, if the worker works for less than four hours;
- (b) double the worker's daily task rate, if the worker works for more than four hours.

2.8.4 A time-rated worker who works on public holiday must be paid –

- (a) the worker's daily rate of pay, if the worker works for less than four hours on the public holiday;
- (b) double the worker's daily rate of pay, if the worker works of more than four hours on the public holiday.

2.9 Sick Leave

2.9.1 Only workers who work four or more days per week have the right to claim sick-pay in terms of this clause.

2.9.2 A worker who is unable to work on account of illness or injury is entitled to claim one day's sick leave for every full month that the worker has worked in terms of a Contract.

2.9.3 A worker may accumulate a maximum of twelve days' sick leave in a year.

2.9.4 Accumulated sick-leave may not be transferred from one Contract to another Contract.

2.9.5 An employer must pay a task-rated worker the worker's daily task rate for a day's sick leave.

2.9.6 An employer must pay a time-rated worker the worker's daily rate for a day's sick leave.

2.9.7 An employer must pay a worker sick pay on the worker's usual payday.

2.9.8 Before paying sick-pay, an employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is :

- (a) absent from work for more than two consecutive days; or
- (b) absent from work on more than two occasions in any eight-week period.

2.9.9 A medical certificate must be issued and signed by a medical practitioner, a qualified nurse or a clinic staff member authorized to issue medical certificates indicating the duration and reason for incapacity.

2.9.10 A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Disease Act.

2.10 Maternity Leave

2.10.1 A worker may take up to four consecutive month's unpaid maternity leave.

2.10.2 A worker is not entitled to any payment or employment-related benefits during maternity leave.

2.10.3 A worker must give her employer reasonable notice of when she will start maternity leave and when she will return to work.

2.10.4 A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so.

2.10.5 A worker may begin maternity leave –

- a. four weeks before the expected date of birth; or
- b. on an earlier date –
 - i. if a medical practitioner, midwife or certified nurse certifies that it is necessary for the health of the worker or that of her unborn child; or
 - ii. if agreed to between employer and worker; or

- c. on a later date, if a medical practitioner, midwife or certified nurse has certified that the worker is able to continue to work without endangering her health.

2.10.6 A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth.

2.10.7 A worker who returns to work after maternity leave, has the right to start a new cycle of twenty-four months employment, unless the EPWP on which she was employed has ended.

2.11 Family Responsibility Leave

2.11.1 Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances –

- a. when the employee's child is born;
- b. when the employee's child is sick;
- c. in the event of a death of –
 - i. the employee's spouse or life partner;
 - ii. the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling.

2.12 Statement of Conditions

2.12.1 An employer must give a worker a statement containing the following details at the start of employment –

- (a) the employer's name and address and the name of the EPWP;
 - (b) the tasks or job that the worker is to perform; and
 - (c) the period for which the worker is hired or, if this is not certain, the expected duration of the Contract;
 - (d) the worker's rate of pay and how this is to be calculated;
 - (e) the training that the worker will receive during the EPWP.
- i. An employer must ensure that these terms are explained in a suitable language to any employee who is unable to read the statement.
 - ii. An employer must supply each worker with a copy of these conditions of employment.

2.13 Keeping Records

2.13.1 Every employer must keep a written record of at least the following –

- (a) the worker's name and position;
- (b) in the case of a task-rated worker, the number of tasks completed by the worker;
- (c) in the case of a time-rated worker, the time worked by the worker;
- (d) payments made to each worker.

2.13.2 The employer must keep this record for a period of at least three years after the completion of the EPWP.

2.14 Payment for the Labour-Intensive Component of the Works

Payment for works identified in the Scope of Work as being labour-intensive shall only be made in accordance with the provisions of the Contract if the works are constructed strictly in accordance with the provisions of the scope of work. Any non-payment for such works shall not relieve the Contractor in any way from his obligations either in Contract or in delict.

2.14.1 An employer must pay all wages at least monthly in cash or by cheque or into a bank account.

2.14.2 A task-rated worker will only be paid for tasks that have been completed.

2.14.3 An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the Contractor having submitted an invoice to the employer.

2.14.4 A time-rated worker will be paid at the end of each month.

2.14.5 Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.

2.14.6 Payment in cash or by cheque must take place –

- (a) at the workplace or at a place agreed to by the worker;
- (b) during the worker's working hours or within fifteen minutes of the start or finish of work;
- (c) in a sealed envelope which becomes the property of the worker.

2.14.7 An employer must give a worker the following information in writing –

- (a) the period for which payment is made;
- (b) the numbers of tasks completed or hours worked;
- (c) the worker's earnings;
- (d) any money deducted from the payment;
- (e) the actual amount paid to the worker.

2.14.8 If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it.

2.14.9 If a worker's employment is terminated, the employer must pay all monies owing to that worker within one month of the termination of employment.

2.15 Deductions

2.15.1 An employer may not deduct money from a worker's payment unless the deduction is required in terms of a law.

2.15.2 An employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay.

2.15.3 An employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement law, court order or arbitration award concerned.

2.15.4 An employer may not require or allow a worker to –

- a) repay any payment except an overpayment previously made by the employer by mistake;
- b) state that the worker received a greater amount of money than the employer actually paid to the worker; or
- c) pay the employer or any other person for having been employed.

2.16 Health and Safety

2.16.1 Employers must take all reasonable steps to ensure that the working environment is healthy and safe.

2.16.2 A worker must –

- a) work in a way that does not endanger his/her health and safety or that of any other person;
- b) obey any health and safety instruction;
- c) obey all health and safety rules of the EPWP;
- d) use any personal protective equipment or clothing issued by the employer;
- e) report any accident, near-miss incident or dangerous behavior by another person to their employer or manager.

2.17 Compensation for Injuries and Diseases

2.17.1 It is the responsibility of the employers (other than a Contractor) to arrange for all persons employed on a EPWP to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.

2.17.2 A worker must report any work-related injury or occupational disease to their employer or manager.

2.17.3 The employer must report the accident or disease to the Compensation Commissioner.

2.17.4 An employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

2.18 Termination

- 2.18.1 The employer may terminate the employment of a worker for good cause after following a fair procedure.
- 2.18.2 A worker will not receive severance pay on termination.
- 2.18.3 A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the manager the employer in advance to allow the employer to find a replacement.
- 2.18.4 A worker who is absent for more than three consecutive days without informing the employer of an intention to return to work will have terminated the Contract. However, the worker may be re-engaged if a position becomes available of the balance for the 24-month period.
- 2.18.5 A worker who does not attend required training events, without good reason will have terminated the Contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.

2.19 Certificate of Service

On the termination of employment, a worker is entitled to a certificate stating –

- a) the worker's full name;
- b) the name and address of the employer;
- c) the EPWP on which the worker worked;
- d) the work performed by the worker;
- e) any training received by the worker as part of the EPWP;
- f) the period for which the worker worked on the EPWP;
- g) any other information agreed on by the employer and worker.

2.20 Contractor's default in payment to Labourers and Employees

- a) Any dispute between the Contractor and labourers, regarding delayed payment or default in payment of fair wages, if not resolved immediately may compel the Employer to intervene.
- b) The Employer may, upon the Contractor defaulting payment, pay the moneys due to the workers not honoured in time, out of any moneys due or which may become due to the Contractor under the Contract.

2.21 Provision of Hand tools

- a) The Contractor shall provide his labour force with hand tools of adequate quality, sufficient in numbers and make the necessary provisions to maintain the tools in good and safe working conditions

2.21.1 Reporting

The Contractor shall submit monthly returns/reports as specified below:

- a) Signed Muster rolls/pay sheets of temporary workers and permanent staff detailing the number, category, gender, rate of pay and daily attendance.
- b) Copies of identity documents of workers
- c) Number of persons who have attended training including nature and duration of training provided
- d) Assets created, rehabilitated or maintained in accordance with indicators in the EPWP M&E framework
- e) Plant utilization returns
- f) Progress report detailing production output compared to the programme of works.

3. LABOUR-INTENSIVE COMPETENCIES OF SUPERVISORY AND MANAGEMENT STAFF

Contractors shall only engage supervisory and management staff in labour-intensive works that have completed the skills programme including Foremen/ Supervisors at NQF level 4 "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 (See Appendix C) at NQF outlined in Table 1.

Table 1: Skills programme for supervisory and management staff

Personnel	NQF	Unit standard Titles	Skills Programme Description
Foreman / Supervisor	4	Implement Labour-Intensive Construction Systems and Techniques or equivalent QCTO qualification	This unit standard or qualification must be completed, and any one of the 3 unit standards or part qualifications must be completed
		Use Labour-Intensive Construction Methods to Construct and Maintain Roads and Stormwater Drainage or equivalent QCTO qualification	
		Use Labour-Intensive Construction Methods to Construct and Maintain Water and Sanitation Services or equivalent QCTO qualification	
		Use Labour-Intensive Construction Methods to Construct, Repair and Maintain Structures or equivalent QCTO qualification	
Site Agent / Manager	5	Manage Labour-Intensive Construction Processes or equivalent QCTO qualification	Skills Programme against this single unit standard or part qualification

3. EMPLOYMENT OF UNSKILLED AND SEMI-SKILLED WORKERS IN LABOUR-INTENSIVE WORKS

a. Requirements for the Sourcing and Engagement of Labour

4.1.1 Unskilled and semi-skilled labour require 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.

4.1.2 The rate pay set for the EPWP is R288.09 per day.

4.1.3 Tasks established by the Contractor must 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.

4.1.4 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 4.1.3.

4.1.5 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.

4.1.6 The Contractor shall endeavor to ensure that the expenditure on the employment of temporary workers is at least 35% of local labour and in the following proportions:

- (a) 55 % women;
- (b) 55 % youth who are between the ages of 18 and 35; and
2 % on persons with disabilities.

4.2 Specific Provisions Pertaining to SANS 1914-5 2002

Definitions:

- 4.2.1 Targeted labour: Unemployment persons who are employed as local labour on the project.
- 4.2.2 Contract participation goals
 - 4.2.2.1 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.
 - 4.2.2.2 The wages and allowances used to calculate the Contract participation goal shall, with respect to both time-related and task rated workers, comprise all wages paid and any training allowance paid in respect of agreed training programmes.
- 4.2.3 Terms and conditions for the engagement of targeted labour

Further to the provisions of clause 3.3.2 of SANS 1914-5, written Contract s shall be entered into with targeted labour.

4.2.4 Variations to SANS 1914-5

4.2.4.1 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.

4.2.4.2 The schedule referred to in 5.2 shall in addition reflect the status of targeted labour as women, youth and persons with disabilities and the number of formal trainings provided to targeted labour.

4.3 Training of Targeted Labour

A suitably capable Training consultant (consultants based within VDM are to be given first preference) is to be employed on this project.

Their duty is to identify suitable persons and train them for the following:

- i. Employee Training – community-based labour
 - ii. Employer Training – community-based Contractors
 - iii. Committee Training – maintenance and operation of the Works (this however falls outside the scope of this Contract)
- 4.3.1 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.
 - 4.3.2 The cost of the formal training of targeted labour, shall be measured and paid for in the schedule of quantities of this Contract Document.
 - 4.3.3 The Contractor shall do nothing to dissuade targeted labour from participating in training programmes and shall take all reasonable steps to ensure that each beneficiary is provided with two days of formal training for every 22 days worked.
 - 4.3.4 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 4.3.4 above.
 - 4.3.5 Proof of compliance with the requirements of 4.3.2 to 4.3.4 must be provided by the Contractor to the Employer prior to submission of the final payment certificate.

Typical training that will be given by the Training Consultant is:

I. Community based Contractors

- Preparation phase – using a calculator, numeracy, using a scale ruler, reading a building plan, handling administrative tasks in the building industry.
- Estimating and tendering – marketing the services of a company, seeking, selecting, collecting and studying tender documents, investigating and assessing a site, developing a bill of quantities from building plants, calculating the cost of a project, finalizing tender prices, completing and submitting a tender.
- Project planning – introducing to planning techniques, pre-tender planning, planning Contract activities, Contract planning, executing a Contract programme.
- Executing the project – managing the finances of the company, managing materials, administering record systems, managing manpower, completion and handover.

II. Community based labour

Local labour will be taught the following skills:

- Excavation if possible, bedding, selected backfill and backfill
- Pipe laying, valves and fittings
- Valve boxes, manholes, anchor blocks etc.

Again, the Contractor and Training Consultant will have to work closely together to identify what their requirements are and when this labour is needed.

Community based labour training will take place on site before actual production starts. Allowance needs to be made for wages, food or travelling during training.

Training of community-based Contractors will take place at a central point. The Provincial Sum allowed in the Schedule of Quantities, makes allowance for travelling and meals for the training of community-based Contractors.

4. **COMMUNITY LIAISON OFFICER**

1.1 The successful Bidder shall enter into an agreement with the Ward Councilor/Ward Committee whereby the Ward Councilor shall provide to the Contractor the following if necessary:

- a) A Community Liaison Officer (CLO) for liaison with the recipient community, who as part of his/her duties will also act as a Labour Desk Officer (LDO) for labour recruitment.

1.2 The CLO shall attend all site and other meetings concerning the project.

1.3 The agreement shall make provision for the payment by the Contractor to the CLO a maximum amount calculated as follows:

Salary per month =R 10000.00

1.4 Only one CLO shall be appointed per project. If the project spans over more than one Ward or villages, the relevant Ward Councilors shall agree on one CLO to be appointed by the Contractor. Should no agreement be found as envisaged, the relevant Project Manager together with the Executive Director: Integrated Community Development, or their nominees, will interview prospective appointees and in their discretion appoint such CLO.

1.5 Notwithstanding the above, if the vastness of the project requires the use of more than one CLO, this will be permitted provided that the total monthly sum paid to all CLO's shall not exceed the amount allowed for in the Bill of Quantities.

1.6 Should the Contractor experience any difficulties with the community, these difficulties shall immediately be brought to the attention of the Department/Project Manager who shall arrange a meeting with the relevant Ward Councilor(s) and the CLO to resolve such difficulties.

1.7 The main Contractor shall ensure that any Sub-Contractor he may appoint shall adhere to these conditions but also subject to the proviso's applicable to the duration of such sub-Contract.

1.8 Should any of the above conditions be less favorable than any Bargaining Council Agreement

or Act applicable to the Contractor, the more favorable condition will apply.

6 Existing services

The Contractor shall protect all existing services

7 Site establishment

a) Contractor's Camp site

The Contractor shall provide a suitable site for his camp and for accommodating the work force. The choice of the site for the establishment of the camp, offices and the layout thereof, shall be approved.

The camp site shall be cleared and grubbed and properly fenced with a security fence around the perimeter. The Contractor is to provide his own security at the camp or on the site if required, at his own expense. No trees may be removed and the Contractor must provide his own firewood.

After completion of the Contract, the Contractor shall remove all his temporary buildings, plant and equipment. The site shall be made good and be left in a neat and tidy condition before the certificate of practical completion shall be issued.

b) Water Supply

The Contractor shall make his own arrangement for potable and construction water. It shall be the responsibility of the Contractor to apply for a water connection for his site camp. The Contractor shall be responsible for payment of all water used. Water quality shall be verified before use in concrete is allowed.

c) Power Supply

The Contractor shall make his own arrangements.

d) Ablution Facilities

The Contractor shall, at each construction area, provide sufficient portable chemical latrine units. The latrine units shall be serviced daily and kept in a hygienic and orderly state to the approval of the Employer's Agent. No separate payment shall be made for this requirement and the costs thereof shall be deemed to be included in the rates billed for the Contractor's time-related obligations.

e) Cellular Telephone

It is a requirement of the Contract that the Contractor shall equip his Construction Manager(s) with a cellular telephone to allow for effective communication between the Contractor's supervisory personnel and the Employer's Agent's supervisory staff. All the applicable contact details must be made available to the Employer as well as the staff on site. All costs associated with the provision of cellular telephones for the Contractor's personnel shall be deemed to be included in rates billed for time-related charges.

f) Site Facilities required by the Employer's Agent

One site office of approximately 30m² complete with sufficient lighting and power points.

- Two desks, ten chairs, one conference table and two steel filing cabinets.
- Three carports for his exclusive use, a net shade cover will suffice.
- An ablution unit for his exclusive use.
- The Employer's agent does not require housing for personnel or laboratory facilities.

g) PPE (Printing on PPE)

PPE (Overalls) shall be Pantone Orange with/without reflective tape and shall be branded as follows:

- Implementer's Logo (printed or embroidered) on the left front pocket location i.e. over the heart

-
- position. (full colour)
 - EPWP logo on the right front pocket (printed or embroidered) location (full colour)
 - The letters EPWP on the back of the PPE in BLACK
 - The program name eg Vuk'uphile is to be printed on the right sleeve of short sleeved apparel and need not be placed on long sleeved apparel.
 - Where required, lime green safety vests are to be branded with similar specification above. In this instance the Overalls may not necessarily
 - be branded provided that the use of high visibility vests is mandatory.
 - All artwork and PPE samples shall be approved and signed off by the consultant prior to printing/embroidering

ANNEXURE 1 – PRO FORMA EPWP CONTRACT OF EMPLOYMENT

PRO FORMAEXPANDED PUBLIC WORKS PROGRAMME
CONTRACT OF EMPLOYMENT BETWEEN

CONTRACTOR

Name:.....

Address:.....

ID:.....

AND

WORKER

Name:.....

Details:.....

ID:.....

1. I am pleased to confirm that you have been appointed to work on a task based employment contract within the Expanded Public Works Programme (EPWP) project. Within this employment contract you will undertake numerous groups of tasks.
2. This employment contract must be read in conjunction with the standard terms and conditions of employment on EPWP attached herewith.
3. The project where you will be employed is located at.....
4. This employment contract will start on.....
and on end on
5. You must be aware that this employment contract is a limited term contract and not a permanent job. This employment contract may be terminated for any one of the following reasons:
 - a) The contractor does not get additional contracts through the EPWP.
 - b) Funding for the programme in your area comes to an end.
 - c) You repeatedly do not perform in terms of the tasks set out in your work programme.
 - d) You have worked a maximum of 24 months within a 60 month cycle.
6. You will be employed as a within the team.
7. While you are working you will report to.....
8. Payment
 - D1** You will be paid a fixed amount of R.....for completing a fixed amount of work.
 - D2** The amount of work required for the agreed rate of pay will vary from task to task. You will be informed at the beginning of each task or group of tasks how much work you are expected to complete per day.
 - D3** You will only be paid for work completed.
9. In addition to the conditions above, all the terms and conditions of employment on EPWP apply to your employment. If you breach any of these terms your contract may be terminated.
10. Signatures:

Signed on this..... day of.....

Contractor:..... Date:

Worker: Date:

Witness: Date:

VHEMBE DISTRICT MUNICIPALITY

LIMPOPO PROVINCE

REFURBISHMENT OF HARPER WWTW AND PUMP STATION

C3.5 MANAGEMENT

C3.5 MANAGEMENT**1. Construction Programme Clause 5.6 of the General Conditions of Contract**

The Contractor shall submit within the period stated in the Contract Data a suitable and realistic construction programme for the consideration of the Employer's Agent.

The programme shall be in the form of a Gantt chart and shall include the following details:

- A work breakdown structure, identifying the major activity groups.
- For each activity group further details shall be provided with regard to the scheduled start and end dates of individual activities.
- The linkages between activities shall be clearly indicated and the logical network upon which the programme is based shall be separately submitted to the Employer's Agent if requested. Any constraints shall be classified as being time-related or resource-related.
- The critical path(s) shall be clearly indicated and floats on non-critical activities shall be shown.
- The Contractor shall indicate the working hours per day, night, week and month allowed for in the programme.
- Where relevant the Contractor shall state the production rates for key activities, e.g. earthworks, etc.

Together with the programme as detailed above the Contractor shall submit to the Employer's Agent a cash flow projection, indicating projected monthly invoice amounts. The cash flow projection shall be updated at monthly intervals to reflect actual payments to date and anticipated further payments.

The programme will be reviewed at the monthly site meetings at which the Contractor shall provide sufficient detail that will allow the comparison of completed work per activity that has fallen behind. The updated programme shall be submitted to the Employer's Agent at least two days prior to the monthly meetings.

If the programme has to be revised by reason of the Contractor falling behind his programme, he shall produce a revised programme showing how he intends to regain lost time in order to ensure completion of the Works within the time for completion as defined in Clause 5.6.1 of the General Conditions of Contract or any granted extension of time. Any proposal to increase the tempo of work must be accompanied by positive steps to increase production by providing more labour and plant on site, or by using the available labour and plant on site, or by using the available labour and plant in a more efficient manner.

Failure on the part of the Contractor to submit the programme or to work according to the programme or revised programmes shall be sufficient reason for the Employer's Agent to take steps as provided in Clause 5.7.1 of the General Conditions of Contract.

The approval by the Employer's Agent of any programme shall have no Contractual significance other than that the Employer's Agent will be satisfied that the work is carried out according to such programme and that the Contractor undertakes to carry out the work in accordance with the programme. It shall not limit the right of the Employer's Agent to instruct the Contractor to vary the programme if required by circumstances. The Contractor is also referred to Clause 5.6.2 of the General Conditions of Contract when drawing up his programme.

2. Sequence of the works

The sequence of the works will be in the accordance with the approved programme. The works should be programmed to allow for the installation of the pipeline network to suit the budgeted cash flow and construction period.

3. Accommodation of traffic

The following contain the Employer's general requirements for accommodating the traffic during construction:

The travelling public shall have the right of way on public roads and the Contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.

Failure to maintain road signs, warning signs, etc, in a good condition shall constitute ample reason for the Employer's Agent to bring the works to a stop until the road signs, etc, have been repaired to his satisfaction.

The Contractor may not commence constructional activities before adequate provision has been made to accommodate traffic in accordance with the requirements of this document and the South African Road Traffic Signs Manual Volume 2 Chapter 13.

The Contractor shall submit proposals in connection with directional signs to the Employer's Agent for approval prior to construction.

Sufficient signage shall be provided, erected and relocated as necessary by the Contractor to reroute traffic onto the deviations.

4. Extension of time on account of abnormal rainfall

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

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

in which formula the symbols shall have the following meanings:

V = Potential extension of time in calendar days for the calendar month under consideration:

If V is negative and its absolute value exceeds Nn, then V shall be taken as equal to minus Nn.

When the value of V for any month exceeds the number of days in the particular month, V will be the number of days in the month.

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

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

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

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

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

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

- (b) The annual rainfall in the area varies between 500mm and 650mm. A vast amount of land is covered by the savannah veld in the Marea. The Vhembe district municipal area is characterized by flat to gently sloping Bushveld/ Savannah vegetation in the north and central parts, and a mountainous area to the south which forms the border of the Musina local municipality. Cultivated areas (permanent and temporary dry and irrigated land) cover less than 15% of the municipality. Urban areas cover 14% of the municipality.

The potential extension of time V has been calculated for each month and year of the period concerned to indicate the possible effect of the rainfall formula. The values of V were obtained by applying the rainfall formula and using the actual rainfall figures and the calculated values of Rn and Nn indicated in the table.

- (c) The Contractor shall, at his own cost, provide and erect on the Site at a location approved by the Engineer, an approved rain gauge, which shall be fenced off in a manner which will prevent any

undue interference by workmen and others. The Contractor shall, at his own cost, arrange for the reading of the rain gauge on a daily basis for the duration of the Contract. The gauge readings, as well as the date and time at which the reading was taken shall be recorded in a separate record book provided by the Contractor for this purpose. All entries in the rainfall record books shall be signed by the person taking the reading and the gauge shall be properly emptied immediately after each reading has been taken. If required by the Engineer, the Engineer shall be entitled to witness the reading of the gauge.

- (d) The Contractor's claims in terms of Subclause 10.1 of the Conditions of Contract for extension of time in respect of delays resulting from wet climatic conditions on the Site during each month, shall be submitted in writing to the Engineer monthly; provided always that
- (i) the period allowed to the Contractor in terms of Clause 10.1.1.1 of the Conditions of Contract in which to submit his claim for each month shall be reduced to seven (7) days, calculated from the last day of the month to which the claim applies; and
 - (ii) the 28-day period allowed to the Employer's Agent in terms of Subclause 10.1.5 of the Conditions of Contract in which to give his ruling on the claim, shall be reduced to fourteen (14) days.

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

- (e) The extent of any extension of time which may be granted to the Contractor in respect of wet climatic conditions (whether normal or abnormal) shall be determined as the algebraic sum of the "V" values for each month between the Commencement Date and the Due Completion Date of the Contract, calculated in accordance with subclause 4(a) above, provided always that
- (i) rainfall occurring within the period of the Contractor's Christmas shut-down period (referred to in Subclause 1.6 of the Conditions of Contract) shall not be taken into account in the calculation of the monthly "V" values;
 - (ii) rainfall occurring during any period during which the Contractor was delayed due to reasons other than wet climatic conditions on the Site, and for which delay an extension of time is granted by the Employer's Agent, shall not be taken into account in the calculation of the monthly "V" values;
 - (iii) if the algebraic sum of the "V" values for each month is negative, the time for completion will not be reduced on account of subnormal rainfall, and
 - (iv) where rainfall is recorded only for part of a month, the "V" value shall be calculated for that part of the month using pro rata values for N_n and R_n .
- (f) The Employer's Agent shall, simultaneous with granting any extension of time in terms of this clause, revise the Due Completion Date of the Contract to reflect an extension of time having been granted in respect of wet climatic conditions, to the extent of the algebraic sum of all the "V" values for all the preceding months of the Contract, less the aggregate of the " N_n " values for the remaining (unexpired) months of the Contract (viz less aggregate of the potential maximum negative "V" values for the remaining Contract Period). Thus, provided that where such period is negative, the Due Completion Date shall not be revised.
- (g) Any extension of time in respect of wet climatic conditions granted in terms of this clause shall not be deemed to take into account delays experienced by the Contractor in repairing or reinstating damage to or physical loss of the Works arising from the occurrence of abnormal climatic conditions. Extension of time in respect of any such repairs or reinstatement regarding damage shall be the subject of a separate application for extension of time in accordance with the provisions of Clause 5.12 and Clause 10.1 of the Conditions of Contract.

ALTERNATIVE 2 (Critical path method)

- (a) A claim for extension of time in respect of delays suffered by the Contractor in consequence of wet climatic conditions will be considered by the Employer's Agent in terms of Clause 5.12 of the Conditions of Contract and in accordance with provisions set out hereunder.
- (b) For the purposes of extension of time, a delay caused by wet climatic conditions will be regarded as a delay only if, in the opinion of the Employer's Agent, all progress on an item or items of work on the critical path of the Contractor's working programme as approved in terms of Clause 5.6 of the Conditions of Contract has been brought to a halt.
- (c) Unless it is customary to carry out the work, in respect of which a delay was suffered, by rotary shifts or by day and by night, only delays to critical path items experienced as a result of wet climatic conditions during normal working hours (as defined in Clause 5.8 of the Conditions of Contract) will be taken into account for extension of time. This will apply notwithstanding the fact that a delay may have occurred on a portion of the Works on the critical path due to wet climatic conditions, which work was being executed outside the said normal hours with the permission of the Employer's Agent, granted in terms of Subclause 5.8.1.1 of the Conditions of Contract.

RAINFALL TABLE

- (a) The Contractor shall make due allowance within his programme submitted in terms of Clause 5.6 of the Conditions of Contract, for a total anticipated delay to items on the critical path resulting from wet climatic conditions, of Fifteen (15) normal working days (as defined in Clause 5.8 of the Conditions of Contract) during the Contract.
- (b) Extension of time, if granted by the Employer's Agent, will be determined as the aggregate number of normal working hours for which all progress on the item or items on the critical path was brought to a halt as a result of wet climatic conditions, less the number of normal working days specified in subclause (d) above.

In determining the revised Due Completion Date of the Contract, the Employer's Agent shall add the equivalent number of normal working days delay determined in accordance with subclause (e) and all intervening normal non-working days to the prevailing Due Completion Date.

5. Community participation

Community participation consists of engagement of Project Steering Committees (PSC). A PSC will be established for the town by the Ward Councilor. The functions of the PSC will be to:

- a) Assist in monitoring the project.
- b) Ensure that the community provide assistance to the Contractor to ensure that he can execute the Contract in accordance with the specifications and within time.
- c) Encourage the community to participate in the Labour-Intensive construction.
- d) Identify skills, skilled personnel and suppliers in the towns.

The PSC will not have the power to:

- a) Give any instructions to the Contractor, except through the Employer's Agent.
- b) Become involved in the daily operations of the Contractor or interfere with the Contract works.

A monthly meeting will be held with the PSC to discuss relevant matters. The Construction Manager and resident Employer's Agent will attend the meetings. The Contractor will have to report on progress, deviations from the programme, financial matters community related aspects, general problems and co-operation at the meeting. The PSC members will not receive any remuneration for attending, and they must provide their own transport.

VHEMBE DISTRICT MUNICIPALITY

LIMPOPO PROVINCE

REFURBISHMENT OF HARPER WWTW AND PUMP STATION

**C3.6 PARTICULAR SPECIFICATIONS AND VARIATIONS AND ADDITIONS TO THE
STANDARD SPECIFICATIONS**

C3.6.1 VARIATIONS AND ADDITIONS TO THE STANDARD SPECIFICATIONS
PSA GENERAL (SANS 1200 A)

Interpretations**Definitions**

(a) General

Add the following definitions: -

“General Conditions: The General Conditions of Contract specified for use with this Contract and the Special Conditions of Contract as applicable.

Specified: As specified in the Standardised Specifications, the Drawings or the Project Specifications. Specifications shall have the corresponding meaning, as provided for in sub-clause 1(1)(u) of the General Conditions of Contract”.

Measurement and Payment

Replace the definitions for fixed charge, time-related charge and value-related charge with the following:

“Fixed Charge: A charge that is not subject to adjustment on account of variation in the value of the Contract amount or the Contract time for completion.

Time-related Charge: A charge, the amount of which is varied in accordance with the time for completion of the work as adjusted in accordance with the provisions of the Contract.

Value-related Charge: A charge, the amount of which is varied pro rata the final value of the measured work executed and valued in accordance with the provisions of the Contract.

PSA 1 MATERIAL (Subclause 3.1)**PSA 1.1 QUALITY**

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

Materials shall bear the official mark of the appropriate standard.

Substitute the second paragraph with the following:

The Contractor is responsible for the cost of all testing to ascertain that the materials do comply with the relevant minimum requirements and all such costs shall be deemed to be included in the tendered rates. The cost of control tests done by the Employer's Agent and of which the results do not comply with the minimum requirements shall be for the Contractor's account. The Contractor shall inform the Employer's Agent of any control testing to be done at least 48 hours before such tests are required and must allow in his program for the time necessary for the tests and the processing of the results thereof. The handling, storage, transport, and erection of equipment, machinery, and materials shall be strictly in accordance with the requirements of the supplier and/or manufacturer.

All materials shall be new and of the best quality available unless otherwise specified. They must function satisfactorily under prevailing climate and weather conditions at the place of installations

PSA 2 PLANT**PSA 2.1 CONTRACTOR'S OFFICES, STORES AND SERVICES (Subclause 4.2)**

Add the following to this subclause:

PSA 2.1.1 STORAGE

The Contractor shall supply sufficient protection for perishable materials to the satisfaction of the Employer's Agent, and all materials shall be used in the order in which it was delivered. Cement older than three months shall be removed from the site and shall not be used in the Works.

PSA 2.1.2 RESTRICTIONS ON EMPLOYEE ACCOMMODATION

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

The Employer will place at the disposal of the Contractor an area to enable him to erect his site offices, workshops, stores, and any temporary housing the Contractor may wish to erect for his personnel. The temporary housing and ablution facilities shall comply with the requirements of the local Authority.

PSA 2.2 CAPACITY OF PLANT AND EQUIPMENT (Clause 4)

Add as Clause 4.3:

The Contractor shall supply plant and equipment in sound working condition and of adequate capacity to complete the Works well within the period or periods specified or stated in the appendix to the tender.

In addition, he shall have available on the Site adequate standby plant to ensure that operations designed to be executed continuously are not disrupted because of breakdown of any plant provided for such operations.

PSA 3 CONSTRUCTION**PSA 3.1 DETAILED SETTING OUT (Subclause 5.1.1)**

The Contractor shall be solely responsible for the execution of the works to the correct line and level.

The Contractor shall carefully set out the works, employing a capable surveyor to the lines and levels gleaned from information provided.

The proposed network pipes must be placed 2,0m away from the erf boundaries in the road reserve. The tolerance allowed in setting out shall be 10mm either way.

Work set out by the Contractor shall be checked by the Employer's Agent whereafter any errors be rectified by the Contractor.

The Contractor shall provide at least three days' notice of such a check to the Employer's Agent. The Contractor shall supply any material and labour required for the control survey work by the Employer's Agent including the supply of and placing the necessary pegs, sight rails, etc.

Any discrepancy shall immediately be reported in writing to the Employer's Agent. Any costs or subsequent costs arising from discrepancies, which had not been reported to the Employer's Agent, shall be the sole responsibility of the Contractor.

Any assistance, including checking, rendered to the Contractor by the Employer's Agent shall not be held as relieving the Contractor of his responsibility in this respect. Should any portion of these works be constructed incorrectly, the Contractor shall at his own expense rectify the work to the satisfaction of the Employer's Agent.

The Contractor shall be held solely responsible for the protection of all bench marks, reference pegs and level pegs.

The Contractor shall establish at least three benchmarks at selected points.

PSA 3.2 WATCHING, BARRICADING, LIGHTING AND TRAFFIC CROSSINGS
(Subclause 5.2)

Add the following to this subclause:

The Contractor shall ensure that he complies with all the requirements of the authorities concerned with respect to the safety of the works and labourers, including the provision and wearing of protective clothing. Any negligence or non-compliance of any of these requirements shall be viewed in a serious light and shall be sufficient reason for the Employer's Agent to order the immediate suspension of the total extent of the Works.

The Contractor shall provide for artificial lighting for any part of the Works that may be required for the proper execution of the work.

The crossing of existing tar and dirt roads must be done in half widths, while the total traffic is accommodated on the other lane. Road traffic signs shall comply with the requirements of the "South African Road Traffic Signs Manual" and shall be approved by the Employer's Agent before construction commences.

PSA 3.3 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES (Subclause 5.4)

Add the following to the subclause:

Before commencing any excavation, the Contractor shall verify the position of all known or suspected obstacles by inspection of the site, examination of drawings or, where necessary by the excavation of trial holes. Any damage caused to existing services and works shall be repaired as expeditiously as possible by the Contractor at his own expense and shall be reported immediately to the Employer's Agent.

Where permanent protective works are ordered by the Employer's Agent, such works shall be valued as a variation. The Employer's Agent will supply the Contractor with such information as may be available concerning obstructions and services, but whilst such information is given in good faith, it shall not relieve the Contractor of any of his liabilities, obligations and risks under the Contract.

The Contractor shall be responsible for any damage to such public services and existing works in the execution of this Contract and shall reimburse the Public Authority or the Owner concerned for any repairs required or compensation for damage awarded.

Any alteration to public services shall be carried out by the Authority concerned.

The Contractor shall provide the necessary assistance during any operations necessary in connection with the removal, alteration or safeguarding of any public service.

The relevant authority and Employer's Agent shall be informed of any damages without delay.

PSA 3.4 DEALING WITH WATER ON WORKS (Subclause 5.5)

Add the following to the subclause:

The Contractor shall be responsible for the dewatering of excavations and the full and adequate protection of the works against damage by storm or water from any source whatever. He shall construct all necessary diversion works and drains to deal adequately with and bypass all water and carry out any necessary pumping of water and supply all tarpaulins or other covers which may be required to protect any section of the work during heavy rain or storm together with any other labour work and material which, in the opinion of the Employer's Agent is necessary to keep the work dry and safe at all times.

Full risk and cost of dealing with water shall be borne by the Contractor.

PSA 3.5 POLLUTION (Subclause 5.6)

Add the following to the subclause:

The Contractor shall maintain all access roads and the area where the offices, stores and workshops are situated to the satisfaction of the Employer's Agent. It shall be kept damp to limit dust and inconvenience or disturbance to the residents in the neighbourhood of the Works to a minimum.

PSA 3.6 DEGREE OF ACCURACY (Subclause 6.2)

Delete this subclause and replace with the following:

The Contractor shall construct each of the various parts of the Works to the degree of accuracy specified in the relevant standardized specification.

PSA 4 TESTING**PSA 4.1 APPROVED LABORATORIES (Subclause 7.2)**

Add the following to this subclause:

No laboratory facilities are required on site. The Contractor shall use an independent laboratory for the necessary tests. Unless otherwise stated in the Bill of Quantities, the cost of all tests shall be for the account of the Contractor and no additional payment will be made for them.

PSA 5 MEASUREMENT AND PAYMENT (Clause 8)**PS A 5.1 Fixed-Charge and Value-Related Items****PSA5.1.1 Contractual Requirements. Unit: Sum**

The sum shall cover the Contractor's initial costs of providing sureties, insurance of the works and plant, third party or public liability insurance and unemployment insurance to cover his compliance with the requirements of the Workmen's Compensation Act, 1941 (Act NO. 30 of 1941) and any other initial financing obligations of a preliminary and general nature, such as contributions to the CEITB. The tendered amounts for fixed-charge and value-related items will not be increased, if extension of time for the completion of the works is awarded.

PS A 5.1.2 Establishment of Facilities on the Site**PS A 5.1.2.1 Facilities for Engineer**

- a) Furnished office (No) Unit: Sum
- b) Carport..... Unit: Sum
- c) Name-board (No.)..... Unit: Sum
- d) Telephone Unit Sum
- e) Survey Assistant..... Unit Sum
- f) Survey Equipment... ..Unit Sum

PS A 5.1.2.2 Facilities for the Contractor

- a) Offices and storage sheds Unit: Sum
- b) Workshops Unit: Sum
- c) Laboratories Unit: Sum
- d) Living accommodation Unit: Sum
- e) Ablution and latrine facilities..... Unit: Sum

f) Tools and equipment.....	Unit: Sum
g) Water supplies, electric power and communications	Unit: Sum
h) Dealing with water	Unit: Sum
i) Access	Unit: Sum

PSA 5.1.3 Other Fixed-Charge Obligations..... Unit: Sum

This item as listed under Schedule A of the bill of quantities is as specified in the standardised specification SANS 1200 A.

PSA 5.1.4 Removal of Site EstablishmentUnit: Sum

The sum shall cover the cost of the demolition on and the removal from the surface of the site of all items established in terms of 8.3.2 and 8.3.3, and shall provide for the making good and the restoring of the Site to the satisfaction of the Engineer

PS A 5.2 TIME-RELATED ITEMS

The tendered amount for a time-related item will be increased; if an extension of time for the completion of the works is awarded with cost on the condition that the activity related to the item tendered for must be sustained during the extended period. The ratio between the increased amount for a time-related item and the tendered amount must be the same as the ratio between the extension of the time period for the completion of the works and the original time period allowed for completion of the works. If the works is completed before the end of the original time period allowed for completion of the works, the tendered amount of a time related item that is influenced by the earlier completion would be reduced similarly.

PS A 5.2.2 SCHEDULED TIME RELATED ITEMS

PS A 5.2.2.1 Facilities for Engineer

a) Furnished office (No).....	Unit: Sum
b) Carport... ..	Unit: Sum
c) Name-board (No.).....	Unit: Sum
d) Telephone.....	Unit Sum
e) Survey Assistant... ..	Unit Sum
f) Survey Equipment.....	Unit Sum

PSA 5.2.2.2 Facilities for Contractor Unit: Sum

The sum shall cover the Contractor's time related costs of providing sureties, insurance of the works and plant, third party or public liability insurance and unemployment insurance to cover his compliance with the requirements of the Workmen's Compensation Act, 1941 (Act NO. 30 of 1941) and any other initial financing obligations of a preliminary and general nature, such as contributions to the CEITB. Establishment of Facilities on the Site Facilities for Engineer

PS A 5.2.2.2 Facilities for Contractor

a) Offices and storage sheds	Unit: Month
b) Workshops	Unit: Month
c) Laboratories.....	Unit: Month
d) Living accommodation.....	Unit: Month
e) Ablution and latrine facilities	Unit: Month

f) Tools and equipment.....	Unit: Month
g) Water supplies, electric power and communications	Unit: Month
h) Dealing with water.....	Unit: Month
i) Access.....	Unit: Month

PSA 5.2.3 Supervision for Duration of Construction..... Unit: Sum

The sum shall cover the costs of on-site supervision and such local administration as the Contractor considers necessary for the proper completion of the Works, and shall cover the cost of the salaries, wages and allowances paid to the Construction Manager, general foreman, section foremen (where applicable), site surveyors, timekeepers, assistants and other site supervisory staff, and of transport incurred in connection with such staff. Plant (designated plant or plant for designated operations or plant for use during Supervision for Duration of Construction).

PSA 5.2.4 Company and Head Office Overhead Costs for the Duration of the Contract... Unit: Sum

The sum shall cover the Contractor's company and head office overhead costs.

PS A 5.3 SUMS STATED PROVISIONALLY BY ENGINEER

PS A 5.3.1 Community Liaison Officer Unit: P/Sum

The Contractor must pay a salary to a person appointed as the Community Liaison Officer for the project. The amount of payment and payment dates will be determined as soon as the Community Liaison Officer is appointed.

PSA 5.3.2 PSC Meetings Attendance Unit: P/Sum

The tendered rate shall cover the compensation of all members of Project Steering Committee for attending meetings. The amount of payment and payment dates will be determined on the commencement date of the project. The Employer's Agent should authorise payment before it is made. Proof of payment has to be submitted to Employer's Agent before claim can be certified.

PS A 5.3.3 Overheads, charges and profit on (1) above Unit: %

Handling cost and profit in respect of sub-item 5.3.1&2. A percentage of the payment made to the Community Liaison Officer and PSC Meeting attendance will be paid to the Contractor. The rate shall cover the Contractor's overheads, charges, and profit on payments for the Community Liaison Officer and PSC members. No payment will be made under this item before payment to the Community Liaison Officer and PSC members.

PS A 5.3.4 Training Unit: P/Sum

Provisional sum for training services supplied by the Training Company. The name and contact details of the Training Company, to be appointed by the Contractor, will be supplied to the Contractor by the Employer or Employer's Agent.

- | | | |
|----|-----------------------------|------------|
| a) | Generic kills..... | Unit:P/Sum |
| b) | Entrepreneurial skills..... | Unit:P/Sum |

PS A 5.3.5 Overheads, charges and profit on (1) above Unit: %

Handling cost and profit in respect of sub-item 8.5(b)1. A percentage of the payment made to the Training Company will be paid to the Contractor. The rate shall cover the Contractor's overheads, charges, and profit on payments for the Training Company. No payment will be made under this item before any payment is made to the Training Company.

PS A 5.3.6 Occupational, Health and Safety Act..... Unit: Sum

Handling cost in respect of sub-item 8.3.5. A percentage of the payment made to the Occupational health and safety act will be paid to the Contractor under this section. The rate shall cover the Contractor's overheads, changes, and profit on payments for the Occupational health and safety act.

10.3.5.1 Provision for safety officer

The Contractor should appoint the safety officer who will be full time responsible for all safety issues on site, and he or she should be full time on site.

The tendered rates include the full compensation for that part of the provision of safety officer in terms of the Occupational Health and Safety Act and the construction regulation which are mainly a function of time. Payment shall be made monthly.

Handling cost in respect of sub-item 8.3.5.2 (a). A percentage of the payment made to the Safety Officer will be paid to the Contractor. The rate shall cover the Contractor's overheads, changes, and profit on payments for the Safety Officer.

PS A 5.3.7 Contractor's time related obligation in respect of the OH&S Act and Construction regulation

The tendered lump sum shall represent full compensation for that part of the Contractor's general obligations in terms of Occupational Health and Safety Act and the Construction Regulations which are mainly a function of time. The lump sum will be paid monthly only after payment for item 1.3.3 and item 1.1.5 has been made Payment of the lump sum shall be made monthly (calculated by the division of the lump sum by the number of months remaining).

PSAB : EMPLOYER'S AGENT OFFICE**PSAB 1 MATERIALS****PSAB 1.1 NAMEBOARDS (Subclause 3.1)**

Add the following to the subclause:

Notwithstanding the provisions of Subclause 3.1 of SANS 1200 AB, the standard nameboards complying with the recommendations of the South African Association of Consulting Engineers shall be provided. Details of the nameboard will be available from the Engineers.

PSAB 1.2 OFFICE BUILDINGS (Subclause 3.2)

Delete this subclause and replace with the following:

The Contractor shall provide the following furnished offices for the use of the Engineer and the Client. Each office shall consist of one room with the following floor area:

- i) Engineers' office : 18 m²

The clear height of all offices between floor and ceiling shall be 2,5m minimum. All windows shall be of the type than can be open over the full window area.

Each office shall be weatherproof, shall have a concrete floor and shall be provided with a ceiling and a lining to the walls, or equivalent insulation, with an acceptable type of door with a secure lock, and two opening windows of glazed area at least 3m². Each office shall be well ventilated and shall be so insulated as to provide comfortable working conditions.

The internal furnishings of each office shall include:

- a) one trestle table, 2m long x 1m wide x 0,9m high, with a smooth top;
- b) one table or desk having a top of size at least 1,5m x 0,9m and at least one lockable drawer;
- c) one high stool;

- d) two chairs;
- e) a lockable upright steel cabinet with three shelves or a steel filing cabinet with four drawers;
- f) shelving of total length 3m and of nominal width 300mm;
- g) an acceptable blind on each window,
- h) a wash-hand basin;
- i) acceptable lighting;
- j) provision for heating in winter and cooling in summer;
- k) one conference type steel table with folding legs of size at least 4,0m x 0,9m.

The Contractor shall also supply a toilet for the exclusive use of the Engineer.

PSAB 1.2 CAR PORTS (New Subclause 3.2 (k))

The Contractor shall provide two permanent car ports for the use of the Engineer. The car ports shall be so constructed that the vehicles parked under them will at all times be shaded from direct sunlight. The car ports shall be at least 20m² in area and shall have a hard stand of crushed stone.

PSAB 2 CONSTRUCTION

PSAB 2.1 SURVEY EQUIPMENT (Subclause 5.5)

Add the following:

The Contractor shall provide the following survey equipment on the site from the commencement to the completion of the Works:

1. 1x Tachometer capable of reading 20 seconds of arc (Total Station);
2. 1x Employer's Agent's level and level staff;
3. 2x Tachometer staffs graduated metrically (Total Station);
4. 1x Steel tape of length 30m.

The tachometer may be shared by arrangement between the Contractor and the Employer's Agent's Representative, but the remaining instruments shall be provided for the exclusive use of the Employer's Agent's Representative. The Contractor shall keep the equipment continuously insured against any loss, damage, or breakage and he shall indemnify the Engineer and the Employer against any claims in this regard. Upon completion of the whole of the Works, the ownership of the equipment shall revert to the Contractor.

The Contractor shall maintain the equipment in good working order and keep it clean throughout the Contract period.

PSAB 2.2 CELLULAR PHONE (New Subclause 4.2)

The Contractor shall supply the Engineer with a cellular phone for the Employer's Agent's sole use. The Contractor shall be responsible for the supply, maintenance, payment of accounts, etc. of the cellular phone. Ownership of the equipment shall be given to the engineer at the end of the Contract.

PSAB 2.3 MEASUREMENT AND PAYMENT OF SURVEY EQUIPMENT

Provide and maintain survey equipmentSUM

The rate shall cover the charges for the provision, insurance and maintenance of the equipment.

PSAB 3 SURVEY ASSISTANTS (Subclause 5.5)

Add the following:

The Contractor shall make available to the Engineer two suitably trained survey assistants for use on and about the SITE at all reasonable times for the duration of the Contract.

PSC: SITE CLEARANCE**PSC 1 MATERIALS (Clause 3)****PSC 1.1 DISPOSAL OF MATERIAL (Subclause 3.1)**

Add to this sub-clause:

Material obtained from clearing and grubbing and from the demolition of structures shall be disposed of in a borrow pit indicated by the Engineer and shall be finished to the satisfaction of the Engineer.

PSC 2 CONSTRUCTION (Clause 5)**PSC 2.1 INDIVIDUAL TREES (Subclause 5.2.3.2)**

Add to this sub-clause:

Should the Contractor remove or damage any tree marked to be preserved, a penalty of R5000,00 per tree shall be payable.

PSC 2.3 EXISTING FENCING

The fencing parallel to the pipeline routes must only be removed and re-erected at the positions as indicated and approved by the Employer's Agent and repaired where it was damaged. When the pipeline routes cross fencing or gates temporary wire gates must be provided that must be kept closed. After completion of the work these fences or gates must be repaired to the same condition as before commencement of the work.

PS C 3 MEASUREMENTS AND PAYMENT**PS C 3.1 SCHEDULED ITEMS****PS C 3.1.1 Clear and grub (0.8m wide) Unit: m**

The removal of all rocks and boulders on site over 0,15m³ will be paid under sub-clause PS DB 8.3.2(b). The removal of hard rock other than boulders will be paid under sub clause PS DB 8.3.2(b).

PSC 3.1.2 Remove and grub large trees and tree stumps of girth

- a) over 1 m and up to and including 2 m Unit: No
 b) over 2 m and up to and including 3 m Unit: No

The girth of a tree or stump will be measured at the narrowest point of the tree or stump in the first metre of its height above ground level. Trees and stumps of girth exceeding 1 m will be measured individually and classified according to site in increments of 1 m as indicated above.

The rate shall cover the cost of clearing and grubbing trees and stumps of all sizes, cutting branches, backfilling holes, and removing, transporting, and disposing of all such trees, stumps, and branches and associated material.

PSC 3.1.3 Remove and grub all trees and tree stumps regardless of girth.....Unit: No

In exceptional circumstances, where construction is carried out through plantations or where the quantity of trees or girth exceeding 1 m renders individual measurement impracticable the project specification may

provide that the clearing and grubbing of trees be measured in hectares. If this method of measurement is used the areas to which it is applicable will be defined clearly on the drawings and the reason for adopting the method of measurement will be stated in the project specification. The rate shall cover the cost of all operations specified.

PSC 3.1.4 Take down existing fence..... Unit: m

The rate shall cover the cost of taking down the fences, coiling wire, sorting and stacking all material at sites indicated by the Engineer and the cost of loading, transporting and offloading such material.

PSDB: EARTHWORKS (Pipe Trenches)

This specification covers earthworks for trenches for all types and sizes of pipes. It covers excavation, the preparation of a trench bottom, backfilling and the reinstatement of surfaces.

PSDB 1 MATERIALS (Subclause 3)

PSDB 1.1 CLASSIFICATION OF EXCAVATED MATERIAL (Subclause 3.1)

Delete this subclause and replace with the following:

Distinction shall be drawn, for payment purposes, between excavation in hard and soft material. All excavation for pipe trenches shall be classified in accordance with the following classification.

PSDB 1.1.1 Soft excavation

Soft excavation shall be excavation in all existing fill material as well as excavation in material which can be efficiently removed by any of the following plant.

A bulldozer having a mass, including the mass of the ripper if fitted of 35 ton and having a flywheel power of approximately 220 kW or a back tractor having 0,15 kW per millimetre bucket width.

PSDB 1.1.2 Hard excavation

Hard excavation shall be excavation in material which cannot be efficiently ripped by plant as described in PSDB 1.1.1. This excavation generally includes material such as formation of weathered rock which can only be removed after blasting or boulders of 0,5 m³ or larger in volume.

The Contractor shall be at liberty to use any method he wishes to excavate any class of material, but the method of excavation shall, however, not dictate the classification of the excavation.

The Engineer shall decide under which one of the above classes any excavation shall be classified and paid for. In the first instance the classification shall be based on inspection of the material to be excavated and the method of excavation proposed by the Contractor. In the event of disagreement between the Contractor and the Engineer, the Contractor shall, if required, make available such mechanical equipment as specified in order to test the reasonable removability or otherwise of the material. The decision of the Engineer as to the classification shall thereafter be final and binding.

The Contractor shall immediately inform the Engineer as and when the nature of the material being excavated changes to the extent that a new classification for further excavation is warranted. Failure on the part of the Contractor to timeously advise the Engineer shall entitle the Engineer to classify, in his sole discretion, such excavation as may have been executed in material of a different nature.

PSDB 1.2 FREEHAUL (Subclause 5.6.8)

Delete this subclause and replace with the following:

The free haul distance within which the Contractor will be required to move material without separate compensation shall be 2,0km. Overhaul will be paid for the moving of material beyond that distance.

PS DB 2 PLANT (Subclause 4.1)

PS DB 2.1 EXCAVATION EQUIPMENT

Add the following to DB 4.1:

An adequate number of suitable tools, including hand stampers, wheelbarrows and hosepipes shall be provided by the Contractor. The Contractor will supply mechanical compaction equipment and when required pneumatic and rock breaking equipment. All excavations exceeding the specified widths shall be backfilled with approved selected material. No payment shall be made for this and all relevant costs shall be deemed to be included in the tendered rates.

PSDB 3 CONSTRUCTION (Clause 5)**PSDB 3.1 PRECAUTIONS****PS DB 3.1.1 Water in Trenches**

Water in pipe trenches may cause movement of the pipes as a result of flotation and backfilling must therefore be executed as quickly as possible. If movement of the pipes does occur the Contractor must, unless otherwise instructed by the Engineer, remove the pipes from the trench and reinstall it at his own expense.

PS DB 3.2 EXCAVATION

Add the following to DB 5.4:

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

PS DB 3.3 TRENCH BOTTOM

Substitute "90 %" in the second paragraph of DB 5.5 with "93 % ".

PS DB 3.3.1 Over Excavation of Trenches

Where pipe trenches are excavated deeper than specified or shown on the drawings, these excavations must be backfilled with suitable approved selected material in layers of not more than 150mm uncompacted thickness and must be compacted to the thickness of the adjoining in-situ material or as prescribed by the Engineer. Over excavation shall be on the Contractor's account.

PS DB 3.4 BACKFILLING**PS DB 3.4.1 General**

Backfilling in road reserves must be compacted in 150mm layers up to natural ground level.

Where prescribed by the Engineer all surplus material must be neatly piled over the real trench width to a height not more than 150mm higher than the adjoining level.

PS DB 3.4.2 Disposal of Soft Excavation Material

Add the following to DB 5.6.3:

All surplus and unsuitable material as described in DB 5.6.3 shall be disposed of at the spoil site, (as described in PS D 5.2.2.3) and levelled.

PS DB 3.5 COMPACTION**PS DB 3.5.1 Areas Subject to Traffic Loads**

Add the following to DB 5.7.2:

All pipe trenches within road crossings, accesses to services, farms and camps that fall within the road reserve, will be regarded as areas subject to traffic loads. Backfilling of trenches that are subject to traffic loads will be executed in layers of 150mm as follows:

Item	% mod AASHTO	Final Layer Thickness
Approved Backfill	93%	150mm
Main Backfill up to road layers	96%	150mm
Sub-base	97%	150mm
Base	98%	150mm

PS DB 3.6 REINSTATEMENT OF SURFACE

PS DB 3.6.1 Private Property and Commonage

Add the following to DB 5.9.2:

Gardens and lawns shall be repaired to the original standard where they were crossed. Grass and plants shall be taken out of the ground, temporarily stocked, watered during construction, and replanted after backfilling.

PS DB 4 MEASUREMENT AND PAYMENT (Subclause 8)

PS DB 4.1 BASIC PRINCIPLES (Subclause 8.1.1)

Change the following in this subclause:

The free haul distance will be 2,0km and not 0,5km.

PS DB 4.2 CALCULATION OF QUANTITIES (Subclause 8.2.3)

Change the first sentence of the subclause to read as follows:

Where volumetrically measurement is necessary, the volume will be computed from the difference in level between natural ground level and 100mm below pipe invert level as shown on the drawings.

PS DB 4.2.1 Shoring

Add the following to DB 8.2.4:

Shoring will only be measured and paid for, if the Engineer gives written approval before it is installed.

PS DB 4.2.2 Excavation

(a) Excavation in all material for trenches, backfill, compact and dispose of surplus material Unit (m)

Item will be provided for various pipe diameters in steps not greater than those specified in 5.2 and various depths in increments of 1.0 m measured to the bottom of the bedding layer (see attached drawings). Where measured volumetrically in terms of 8.1.2 (a), the volume of excavation will be computed in accordance with 8 2.2 and 8.2.3

The rate shall cover the cost of the same operation in heading where the Contractor elects to use such a method of excavation. The volume or length will be measured for payment on the assumption that normal trench excavation has been carried out. The volume or length in the undisturbed prism of material between the top of the tunnel and ground level will be classified as soft excavation in terms of 3.1. No additional payment will be made for such headings and no deductions will be made for reduced excavation quantities.

(b) Extra-over item (a) above for:

1. Intermediate excavation Unit: m³
2. Hard rock excavation..... Unit: m³

3. Hand excavation and backfill where ordered by the engineer Unit: m³

4. Soil Crete backfilling were directed by the engineer Unit: m³

Separate items will not be provided for depth increment, volume will be computed from the trench width determined in accordance with 8.2.3 and the depth from the top of the intermediate or hard rock excavation, as the case may be, either to the bottom of the same material or to the bottom of the trench as specified in (a) above, whichever is the lesser (see Drawing DB 5

The rates shall cover the additional cost of the excavation and hauling of the more difficult material of unsuitable material. The Contractor must obtain written approval for all stages on item (b) (a) 1 to 4.

(c) Excavate and dispose of unsuitable material from trench bottom (provisional... Unit: m³

The volume will be computed from the trench width determined in accordance with 8.2.3 and m³ the additional depth ordered.

The rate shall cover the cost of the excavation of the additional depth in any material, the disposal of the unsuitable material as specified for soft: excavation in 5.6.3 within free haul distance and the backfilling of the additional depth with suitable material from the side of the trench.

PSDB 4.2.3 EXCAVATION ANCILLARIES

PSDB 4.2.3.1 Make up deficiency in backfill material

a) from other necessary excavations on site Unit: m³

b) by importation from-designated borrow pits Unit: m³

c) by importation from commercial or off-site sources selected by the Contractor Unit: m³

Items (b) and (c) above will not be measured for payment unless importation has been ordered in writing. The volume will be computed from the trench width determined in accordance with 8.2.3 and the depth from the top of the backfill to the top of the bedding as shown on Drawing DB-1 or the actual depth of backfill used to make up the deficiency or the depth of additional excavation ordered in terms of B.3.2(c), as applicable.

The rate for material from other necessary excavations on site shall cover the cost of selection of suitable material, the moving of the material to points alongside the trench spaced to suit the Contractor's method of working, and the disposal of the material that is replaced, all within free-haul distance.

The rate for material from designated borrow pits shall cover the cost of royalties, if applicable, excavation and selection of suitable material, the moving of the material to points alongside the trench spaced to suit the Contractor's methods of working, and the disposal of the material that becomes surplus as a result of the importation, all within free-haul distance.

The rate for material from commercial or off-site sources selected by the Contractor shall cover the cost of the acquisition of the material (including royalties, if applicable), the moving of the material to points alongside the trench spaced to suit the Contractor's methods of working, and the disposal of the material that becomes surplus as a result of the importation, all within free-haul distance (see Subclause 5.2.5.1 of SANS 1200 D or Subclause 5.2.6.1 of SANS 1200 DA, as applicable).

PS DB 4.2.3.2 Opening up and closing down of designated borrow pit Unit: Sum

This item will only be scheduled when a new borrow pit has to be established or when access to an existing borrow pit has to be established.

With the exception of the cost of the removal and spreading back of the topsoil (if scheduled), the sum shall cover the cost of opening up and of restoring the Site as specified in Subclause 5.2.2.2 of SANS 1200 D or Subclause 5.2.2(f) of SANS 1200 DA, as applicable.

PS DB 4.2.5 Existing Services

Existing Services-that Intersect or Adjoin a Pipe Trench (see Sub-clauses 5.1.2 and 8.3.8 of SANS 1200 D or Sub-clauses 5.1.3 and 8.3.5 of SANS 1200 DA, as applicable.) (See Subclauses 5.1.2 as applicable.)

(i) Services that intersect a trench (angles between centre-lines in plan of 4590°)..... unit (No)

Except where water pipes are to be recovered, existing water pipes, sewers, stormwater pipes, concrete-lined channels and drains, box culverts, electric cables, ducts, kerbs, channels, erf connections and various sizes of pipes and services that intersect a trench of specified width and require various degrees of care, whether or not their presence is known before they are uncovered, will be measured separately. The unit refers to one service, but services that are so grouped that they can be contained within a horizontal dimension of 200 mm measured at right angles to the axis of the services will be measured as one unit.

(b) Services that adjoin a trench (parallel to or at an angle between centre-lines in plan of less than 45 degrees)..... Unit No)

In a case where a trench of specified width

1 runs parallel to or at an angle (in plan) of less than 45° to an existing service, and is such that the nearer side of the bottom of the trench lies at least partly between a vertical plane and a plane that lies at an angle of 45° below the horizontal, both planes passing through the axis of the service, the length of service within the minimum base width of the trench, determined in accordance with 5.2, will be measured for payment under this item and the remaining length, the side of the trench which, in the opinion of the Engineer, is rendered liable to collapse because of the existence of such service, will be measured for shoring (see 8.3.4(a)).

The rate for an item scheduled in terms of (a) and (b) above shall cover the additional cost of

- i) care in excavation necessitated by the presence of such service in or across the trench;
- ii) protecting and maintaining such service in operation by means of temporary supports or shoring, as necessary;
- iii) delays and disruption of the progress of the work due to the existence of the service¹ and
- iv) repairs necessitated by damage caused by the Contractor.

PS DB 4.2.6 Finishing

PS DB 4.2.6.1 Reinstate road surfaces complete with all courses Unit: m²

Replace DB 8.3.6.1 with the following:

a) Gravel..... Unit: m²

The area will be calculated from the length of finished road or paved surfaces as applicable and with the trench width taken as 0,8m. Payment for finishing will be additional to that for excavation covered by 8.3.2.

The rate shall cover the cost, selective excavation (including the equipment that is required to break up, remove and, if necessary, stockpile the original surface material), and subsequently of reinstating and compaction and shall include the cost of delays and the cost of any risk of having to repair damage as specified in DB 5.10. Compaction to be according to PS DB 5.7.2

SABS 1200 D : CIVIL ENGINEERING CONSTRUCTION : EARTHWORKS

PSD 1 SPECIFICATION FOR BORROW PITS**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 subclause (ii) above, and the excavation beyond the cut-off point shall be in terms of subclause (i) above. (i.e. a material classified as "intermediate" in terms of subclause (ii) may, when not excavated by labour intensive methods, be classified as "soft" in terms of subclause (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 subclause (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	-

"In all cases where soft founding materials is classified as suitable for culvert bedding construction, the in situ material shall be ripped, moistened and compacted to 90% or 93% modified AASHTO density. The depth of preparation and compaction of founding material shall be as indicated on the drawings or as specified by the engineer. Allowance for measurement and payment for this work is made in the bill of quantities under this section."

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.

Scope

This specification establishes general requirements for activities which are to be executed by hand involving the following:

- trenches having a depth of less than 1.5 metres
- bedding and pipelaying

c) blanketing and backfill

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.

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 profile

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 moulded 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 upto 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 thumb-nail; slight indentation produced by pushing geological pick point into soil; cannot be moulded by fingers.
Very dense	High resistance to repeated blows of a geological pick.	Very stiff	Indented by thumb-nail with difficulty; slight indentation produced by blow of a geological pick point.

Trench excavation
All hand excavateable material in trenches having a depth of less than 1,5 metres shall be excavated by hand.

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.

Excavation
All hand excavateable material including topsoil classified as hand excavateable 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.

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.

PROJECT SPECIFICATIONS**C4.2: VARIATIONS AND ADDITIONS****TO STANDARDIZED SPECIFICATIONS****SANS 1200 LD: SEWER****PSLD1 MATERIALS****PSLD 1.1 GENERAL**

Where a manufacturer's product is specified, generic alternatives shall not be used without the *Engineer's* prior written approval.

- Buried Fittings shall be of an approved type with joints and pressure class ratings compatible with the pipe used.
- All materials of construction will be new, free from all defects and imperfections such cracks, tears or porosity, and shall be suitable for the intended application
- Pipes shall not be used for grounding of electrical services.
- All components supplied shall be adequately protected against rust and corrosion during storage, and operational life of the equipment in their planned environment/s.
- No unit will be considered complete until accepted by Engineer.
- The Engineer must have access, at all reasonable times, to those parts of the manufacturing facilities engaged in the manufacture of items in terms of this specification. He is authorized to witness any stage of manufacture, tests and inspect documentation.
- The Engineer is authorised to reject any items not manufactured to the requirements of the agreed standards and this specification.
- All equipment must be inspected at the Supplier's works prior to delivery, to ensure compliance with the specification.
- Machined surfaces, nuts, bolts, washers and screw threads must be protected with suitable corrosion inhibitors.

PSLD 1.2 Pipes, Fittings and Pipe Joints

Sewer pipes shall be uPVC Class 34 (Heavy Duty) to SABS 791 with spigot and socketed compression joints and flanged steel pipes for sewers above ground as specified in the BOQ.

PS LD 1.3 CORROSION PROTECTION**PS L 1.3.2 Protection of Steel Pipes and Accessories**

All the pipe items of steel with diameters from 100mm and more must, unless otherwise specified be provided of three coats of epoxy paint (KSIR 88 or similar) to provide a final film of 300 micron dried thickness. Application must be according to the suppliers' prescription and must be on the inside and outside. Steel pipe items with diameters smaller than 100mm must be protected using galvanising or epoxy paint.

PSLD1.4 Manholes, Chambers

Manholes, chambers and the like shall be constructed of the materials as shown on the Drawings and not as shown in the Figures contained in SANS 1200LD.

For the purpose of measurement and payment, the depth of a manhole, inspection chamber, etc, is

defined as the depth from the top of the cover to the invert level of the manhole, inspection chamber, etc.

The rate for manhole covers the supply and installation of the complete manhole, the construction of the brickwork shaft, heavy duty concrete cover ("Rocla" type or similar with steel mounting ring) and frame and concrete footings for the prevention of floatation where applicable.

PSLD2 CONSTRUCTION

PSLD2.1 Alignment

Sewers shall be constructed as shown on Drawings. The positions of sewers are schematically shown on the drawings. The final position, type of connection and invert levels shall be confirmed with the Engineer during construction

PSLD2.2 Manholes, Chambers, etc

Manholes, chambers and the like shall be constructed in accordance with the details shown on the Drawings.

PSLD2.3 Connecting Sewers

Connecting sewers shall be constructed in accordance with the details shown on the Drawings. At the connection to the existing network in use the Contractor shall give written notice to the Engineer prior to connection to the existing network in use. A representative of the Musina Local Municipality Water & Sanitation must be present at the connection to the existing network.

PSLD 2.4 CONCRETE ENCASING

Replace the first sentence of L 2.4 with the following:

Concrete encasing with concrete with strength of 20 MPa/19mm, must be provided at positions indicated by the Engineer. Provision must be made to keep the pipe in position during the placement of the concrete encasing. The length of concrete encasing will be determined by means of site instructions from the Engineer.

PSLD 2.4.1 Soilcrete Encasing

Add the following:

A mixture of Portland cement and gravel of base quality that is mixed in a ratio of 1:10 must be provided at positions indicated by the Engineer. Provision must be made to keep the pipe in position during the placement of the soilcrete encasing. The length of soilcrete encasing will be determined by means of a site instruction from the Engineer.

PSLD 2.5 ANCHOR BLOCKS

Delete "15 MPa/37,5mm" in the second sentence and replace with "20Mpa/19mm"

PSLD 2.10 CLEANING OF PIPE

Sub clauses (a), (b) and (c) must be adhered to.

PSLD 2.11 PIPE MARKERS

Pipe markers shall be installed at 50m intervals on the pipeline route, at all the newly installed isolation and scour valves as indicated on the detailed drawings as well as at all positions where the pipeline route deviates from the horizontal.

PSLD3 TESTING

The pipes shall be laid to the lines and levels as indicated on the Drawings.

PSLD3.1 Tests and Acceptance/Rejection Criteria

Prior to any air or water test, the interior of each pipeline section between two points of access shall be inspected throughout its length with a mirror and a source of light, so that when looking into the pipe at one point of access (with the aid of the mirror if necessary) and placing the light source at the other point of access, a full circle appears to the observer and the pipe section shall be seen to be unobstructed.

All pipeline sections, which fail to pass this test, shall be cleaned, re-laid, or repaired and re-tested as before by the Contractor, to the satisfaction of the Engineer, all at the Contractor's expense.

LD 8 MEASUREMENT AND PAYMENT

PSLD 8.2 SCHEDULED ITEMS

PSLD 8.2.11 Anchor/Thrust Blocks Unit : m³

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

PSLD 8.2.16 Cut Into And Connect To Existing Mains Unit : No

The number of each type and diameter of pipe cut into shall measure the cutting into existing mains.

The tendered rate shall include full compensation for all arrangements with the relevant authorities, isolating the main, cutting into the main to accommodate the connecting fitting, dewatering, excavating, removing of excess material, taking steps to prevent the ingress of soil, stones and other material into the main as well as all material and labour to connect the pipe.

PSLD 8.2.17 Soilcrete Casing Unit : m³

The soilcrete (1:10 ratio) is measured by volume according to the specified width and depth that exceeds the outside volume of the pipe (the volume of the pipe detracted).

The tariff includes the cost of shuttering and soilcrete mixture.

PSLD 8.2.18 Pipe Markers Unit : No

Pipe markers will be measured and paid for by number and the tariff must include all excavation, installation, and paint and numbering of marker, concrete as well as labour as described in PS LD 2.11.

PSLB BEDDING (Pipes)

Add the following to LB 1.1:

This specification also covers the bedding required for sleeve pipes.

PSLB 1 MATERIALS (Clause 3)**PS LB 1.1 SELECTED GRANULAR MATERIAL**

Substitute LB 3.1 with the following:

Selected granular material shall be an aggregate, sand or granular material, all of a non-cohesive nature and free from any organic material, of which the grading analysis shows 100 % passing a 13, 2 mm sieve and not more than 5 % passing a 0,075 mm sieve. Only if approved by the Engineer may sand from the trench excavations be used as selected material

PS LB 1.2 SELECTED FILL MATERIAL

Substitute LB 3.2 with the following:

The requirements of PS LB 3.1 shall apply mutatis mutandis.

PS LB 1.3 BEDDING

Add the following to LB 3.3:

All pipes shall be classified as flexible pipes and shall have a bedding of selected granular material and selected fill material.

PS LB 1.4 SELECTION**PS LB 1.4.1 Suitable Material from Trench Excavation Available**

Replace the first sentence of LB 3.4.1 with the following:

Notwithstanding the requirements DB 3.7 and LB 3.4.1 relating selected excavation methods, the Contractor must follow selected excavation methods and provide or use plant that will prevent material that is suitable and necessary for bedding being contaminated.

PSLB 1.5 SUITABLE MATERIAL NOT AVAILABLE FROM TRENCH EXCAVATIONS (Subclause 3.4.2)

Change the free haul distance in this subclause from 0,5 km to 2,0 km.

PSLB 2 MEASUREMENT AND PAYMENT**PSLB 2.1 FREEHAUL (Subclause 8.1.6)****PS LB 2.2 PRINCIPLES****PS LB 2.2.1 Provision of Bedding from Trench Excavation**

Selected granular material Unit: m³

Selected fill material Unit: m

The rates shall cover the cost of acquiring, from within 0,5 km, bedding that complies with the relevant requirements of the specification, of delivering it to points alongside the trench spaced to suit the

Contractor's methods of working, and of disposing of displaced material within a free haul distance of 0,5 km.

In terms of the standardized specifications covering pipelines, the rate for the supply and laying of pipelines covers the cost of handling bedding material from alongside the trench and placing it under and around the pipeline

PSLB 2.2.2 Supply only of Bedding by Importation

From other necessary excavations

Selected granular material Unit: m

Selected fill material Unit: m

PSLB 2.2.3 From commercial sources

a) Selected granular material Unit: m

b) Selected fill material Unit: m

The rate shall cover the cost of acquiring, regardless of distance, the required bedding from commercial sources (see Subclause 8.3.4 of SANS 1200 D or Subclause 8.3.4 of SANS 1200 DA, as relevant), of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, and of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, and of disposing of material displaced by such importation, within a free haul distance of 0,5 km.

PSLB 2.2.4 Encasing of Pipes in Concrete..... Unit: m

Separate items will be scheduled for each size of pipe and for each grade of concrete specified. The volume will be computed from the dimensions of the concrete as given on the drawing.

The rate shall cover the cost of dealing with any excavation (in all materials including disposal of surplus) that is additional to that measured under the item for pipe trench excavation, the cost of encasing the pipe in concrete including the cost of formwork (if any), etc., and the cost of formwork to form flexible joints at 4 m centres.

PS LB 2.2.5 Overhaul of material for Bedding cradle and selected fill blanket Unit: m³.km

Substitute LB 8.2.5 with the following:

A) Limited overhaul (0,5 km to 1,0 km) Unit: m³

B) Long overhaul Unit: m³.km

Except that the volume is calculated according to LB 8.1.3, the requirements of D 8.3.6 or DA 8.3.3, as applicable, shall apply for overhaul.

SANS 1200 GA: CONCRETE (SMALL WORKS)

This specification covers the requirements for concrete (plain and reinforced) for small works associated with pipelines, roads, railways, pump stations, etc. It covers the basic materials, the plant and formwork required, the quality, manufacture, and curing of concrete, tolerances in workmanship, testing, and the methods by which the finished structure is to be measured for the purposes of payment

PSGA 1 MATERIAL**PSGA 1.1.1 Applicable Specifications**

Add the following to G 3.2.1:

Portland cement that conforms to SANS 471

PSGA 1.1.2 Storage of Cement

Add the following to G 3.2.2:

Consignments of cement shall be used in the same sequence as that in which they are delivered to site. No cement shall be used which has been stored on site for a longer period than 6 (six) weeks. All cement so stored for a longer period than 6 (six) weeks, all cement damaged in any way, and all cement which does not comply with the specification, shall be removed immediately and permanently from the site.

PSGA 2 PLANT**PSGA 2.1 Formwork****PSGA 2.1.1 Ties**

Add the following to G 4.4.3:

No ties will be allowed in vertical walls and permanent metal ties shall have a minimum concrete cover of 40 mm. Tie holes shall be filled with an approved non-shrink epoxy grout.

PSGA 3 CONSTRUCTION**PSGA 3.1 REINFORCEMENT****PSGA 3.1.2 Cover**

Substitute G 5.1.3 with the following:

The cover of concrete over reinforcement, unless otherwise indicated on the drawings, shall be not less than 40 mm.

PSGA 3.3 FORMWORK**PSGA 3.3.1 Classification of Finishes**

Add the following to G 5.2.1:

The following surface conditions are required in the various portions of the finished concrete:

- (a) Rough Concealed surfaces and surfaces lower than 100 mm below finished ground level.
- (b) Smooth

All surface finishes not classified as "rough" in paragraph (a) shall be classified as "smooth". All exposed edges unless otherwise indicated on the drawings, shall be chamfered 20 mm x 20 mm by means of triangular fillets fixed to the formwork.

PSGA 3.4 CONCRETE

PSGA 3.4.1 Quality

PSGA 5.4.1.2 Consistency

Add the following to sub clause G 5.5.1.2(a):

The slump of concrete used in water retaining structures may not be less than 30mm and not more than 60mm.

PSGA 3.4.1.2 Strength concrete

Add the following to G 5.5.1.7:

The grade of strength concrete and the maximum nominal size of coarse aggregate for each portion of the works, unless otherwise indicated on the drawings, shall be as follows:

- | | |
|---|--------------|
| (a) Blinding layers and encasing of pipes | 15 MPa/19 mm |
| (b) Benching | 25 MPa/19 mm |
| (c) Screeds | 25 MPa/10 mm |
| (d) Reinforced concrete | 40 MPa/19 mm |

PSGA 3.4.1.3 Durability

Concrete shall be so proportioned to ensure that the water/cement ratio does not exceed 0,5 and, to ensure workability, water-reducing admixtures of approved manufacture shall be used in preference to increasing the cement content.

PSGA 3.4.2 Concrete Surfaces

Add the following to GA 5.4.8.1:

Concrete surfaces under screeds, granolithic finishes or benching shall be brought up to a plane, uniform surface with a suitable screed board.

PSGA 3.4.3 Construction Joints

The use of construction joints must be minimised and may only be placed as shown on the drawings or at positions as approved by the Engineer. At all construction joints in walls a PVC water stop without a centre bulb must be placed as shown on the drawings. Alternative materials with similar properties may be proposed but may only be installed after approval of the Engineer.

PSGA 3.4.4 Wood-floated finish

Where wood floating is specified or scheduled, the surface shall first be given a finish as specified in G 5.5.10.1 and after the concrete has hardened sufficiently; it shall be floated to a uniform surface free from trowel marks. The screed surface shall be wood-floated, either by hand or machine, only sufficiently to produce a uniform surface free from screed marks.

PSGA 3.4.5 Steel-floated finish

Where steel floating is specified or scheduled, the surface shall be treated as specified in PS G 5.5.10.4 except that, when the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the screed surface shall be steel-trowelled under firm pressure to produce a dense, smooth, uniform surface free from trowel marks.

PSGA 4 Measurements and Payment (Clause 8)**PSGA 8.1.1 Formwork**

Formwork, other than formwork covered by 8.1.1.2 and 8.1.4, will be measured as the net area of the face of the concrete to be supported during the deposition of concrete. No deduction will be made for fillets and splays of size up to 50 mm x 50 mm or for openings of diameter up to 0,7 m or of area up to 0.5 m².

Formwork in continuous lengths of narrow widths and of fillets or splays over 20 mm x 20 mm will be measured by length, the width or range of widths being stated in the schedule. Boxing-out, the forming of holes, and other such operations will be measured by number, basic dimensions, perimeters, or drawing references, as stated in the schedule.

The unit rate shall cover the cost of all parts of formwork in contact with the concrete, and the necessary bearers, struts, and other supports, plus the labour and plant necessary to erect and strike such formwork.

PSGA 8.1.2 Reinforcement

Steel for normal reinforced concrete will be measured net by mass of all bars, including supporting steel detailed on the reinforcing schedules. The mass will be computed from the nominal bar size and nominal mass per unit length. No allowance will be made for cutting, waste, spacer devices (materials other than steel bars), or binding wire.

Steel reinforcement for precast concrete units will not be measured unless so scheduled (see 8.6). Welded mesh will be measured by area as shown on the drawings, no allowance being made for cutting, waste, laps, or deductions for end cover. The areas measured will be those of the concrete floor or slab being reinforced by means of mesh. In the case of continuous unit partly reinforced by mesh, the area will be computed from the outside dimensions of the area covered by mesh regardless of whether or not additional reinforcing steel is present in the same area. Steel off cuts resulting from the cutting and bending of reinforcement in accordance with the bending schedules shall be deemed to be the property of the Contractor.

PSGA 8.1.3 Concrete

a) Concrete will be measured net to the dimensions shown on the drawings or to the dimensions cast, whichever are the smaller. Structural elements that are undersized will be measured for payment only if they are accepted by the Engineer

b) No allowance will be made for concrete required to make up overbreak in soft excavation, but payment will be made for additional concrete or formwork, or both, ordered in writing by the Engineer to replace unsuitable material or overbreak in hard rock or in intermediate excavation.

The unit rates shall cover the cost of the provision of concrete (made with ordinary portland cement unless otherwise scheduled), mixing, testing, placing, compacting, the forming of stop-ends and unforeseen construction joints, striking of for levelling as applicable, and curing and repairing where necessary, together with the cost of all parts of formwork in contact with the concrete and the necessary bearers, struts, and other supports, plus the layout and plant necessary to erect and strike such formwork.

SABS 1200 G: CONCRETE (STRUCTURAL)

PSG2 DEFINITIONS.

Replace G 2.3 (a) "Adverse weather" with the following:

Adverse weather shall refer to weather that is unfavorable and disruptive causing delays, damage, unsafe working conditions, and tends to impair the quality of fresh or hardened concrete or otherwise causes concrete to have abnormal properties.

Adverse weather conditions shall include:

- a) Heavy rainfall or flooding
- b) Strong winds or storms
- c) Extreme heat (32°C or higher), or cold (5 °C or below)
- d) Snow, ice, or hail
- e) Fog or low visibility

PSG2 INTERPRETATIONS**PSG2.4.2 Strength concrete**

Concrete strength at 28 days, unless otherwise specified on the drawings or in the Schedule of quantities shall be:

Blinding: Class 15MPa/19mm

Slabs: Class 40MPa/19mm

Beams: Class 40MPa/19mm

Mass concrete: Class 30MPa/19mm

PSG2.4.3 Joints

Notwithstanding Subclause 2.4.3, "designated joints" will only be joints that are shown on the drawings. Any other joints that are required by the Contractor as a result of his construction constraints or for any other reason, whether approved by the Engineer or not, will not be considered to be designated joints as defined in Subclause 2.4.3, i.e. they will be considered to be "non-designated" joints.

PSG3 MATERIALS**PSG3.1 APPROVAL OF MATERIALS**

Replace G 3.1. with the following:

The Contractor shall supply two weeks prior to casting, a concrete mix design to the Engineer for approval, the mix design shall include the following properties:

- a) Workability (slump).
- b) Consistency (water to cement ratio, water content).
- c) Admixtures (where applicable)
- d) Strength (compressive cube/cylinder test).
- e) Durability indicators (permeability, shrinkage).

PSG3.2 CEMENT**PSG3.2.1 Applicable Specifications**

Replace G 3.2.1 with the following:

Portland Cement 15FAepC 15FA”) compliant with the requirements of SANS 831 can be used. The fly-ash cement obtained by blending of the OPC and Pulverised Fly Ash (PFA) shall comply with the requirements of SANS 1466-1988. No other types of cement (e.g. Rapid Hardening Cement, Portland Blast furnace Cement) may be used. If aggregates to be used in this contract are alkali-reactive, the OPC used on this Contract shall not have an alkali content $Na_2O + 0.656K_2O$ which exceeds 0.6% by mass of the cement. For the cement used in conjunction with the selected additional aggregates the alkali content per cubic meter of concrete shall not exceed 2,1kg. The Contractor shall submit the necessary test results to prove the above.

Add the following to G 3.2.1:

"In accordance with the new SANS, all Portland cement (OPC or RH) shall be in accordance with SANSEN 197-1 (CEM II) except for non-structural concrete where CEM I 32.5 is acceptable. Pulverized fly ash (PFA) shall conform to the requirements of SANS1491-2."

PSG3.2.2 Alternative types of Cement

Replace the contents of G 3.2.2 with the following:

"Only ordinary Portland cement (OPC) may be used. Should the Contractor wish to use any other type of cement, he shall obtain the Engineer's prior written approval (see G 8.1.3.2 and 8.1.3.3)."

PSG3.2.3 Storage of Cement

Cement shall be used in the order in which it is received.

Unless approved by the Engineer, cement kept in storage for longer than 10 weeks shall not be used in the Works.

Any cement that contains lumps that cannot easily be crumbled to powder between the fingers, may not be used.

PSG3.3 WATER

Only potable quality water from a source, approved by the Engineer, may be used for mixing concrete. Water from a river or stream may however be used for curing.

PSG3.4 AGGREGATES**PSG3.4.1 Applicable Specification**

Replace the contents of G 3.4.1 with the following

The maximum aggregate size shall be as shown on the drawings.

Add the following new sub-clause to G 3.4.1:

Aggregates may be obtained from local sources subject to testing of its suitability by an approved laboratory and approval by the Engineer.

The maximum water absorption of the coarse aggregate shall not exceed 1% and the flakiness index shall not exceed 25%. The maximum water demand of the fine aggregate shall be 19011m³ and the aggregate shall comply with the requirements of SANS 1083.

Aggregates to be used in this contract shall be tested in accordance with subsection C-15 of SANS 1083 to determine whether they are potentially alkali-reactive. If they are alkali-reactive they shall either be replaced with aggregates that are non-reactive. The fineness modulus of the sand must be between 1,7 and 2,8 with a standard deviation of not more than 0,1. 19 mm aggregate size (maximum 20 mm to be used).

At tender stage the Contractor shall assure himself by means of tests and test mixes by an accredited laboratory that the fine and coarse aggregates that he intends to use comply with the specification. The tendered rates shall therefore be deemed to allow for the importation of aggregates that do comply with the Specification.

The Contractor shall be responsible for locating the sources of all aggregates."

Aggregates shall be tested periodically for reactivity, the cost of which shall be deemed included in the rate tendered for concrete. A design mix will have to be made and the results submitted to the Engineer for approval 14days prior to casting the first concrete.

Add the following new sub-clause to G 3.4.:

PS G3.4.4 Alkali-aggregate Reaction

The quartzite and shale of the Witwatersrand Supergroup contains secondary materials such as silica and calcite believed to be responsible for moderate level of potential alkali reaction reported in reservoirs, bridges. This shall not be used in conjunction with high alkali cement in concrete in any part of the Works.

For the purposes of this clause, a high alkali cement is one in which the equivalent alkali content ($\text{Na}_2\text{O} + 0.658 \text{ K}_2\text{O}$) exceeds 0.60 % by mass of the cement.

In order to ensure that the above requirement is met, the Contractor may elect to use an aggregate other than Witwatersrand Supergroup that complies with the requirements of SANS1 083. Alternatively, if the Contractor chooses to use Witwatersrand Supergroup, he shall comply with the following requirements regarding the cement:

- (a) Before commencing any particular section of the structure, the Contractor shall ensure that he has enough cement that is not a high alkali cement to complete the section,
- (b) Certificates stating the alkali content of each delivery of cement to the Site shall be supplied by the Contractor. These certificates shall be based on tests carried out at a laboratory approved by the Engineer. The cost of testing, including sampling, transporting of samples, and issuing of certificates, shall be borne by the Contractor.
- (c) The Contractor shall be entitled to use an approved brand of cement as a means for ensuring that the permissible alkali content is not exceeded. The Contractor shall make allowance for the higher price of such approved brand, if he chooses to use this method.

(d) High alkali cement delivered to the Site shall be rejected, and the cost of its removal and replacement with cement with acceptable alkali content shall be borne by the Contractor."

PSG3.4.5 Samples

At least one month before commencement of concrete work the Contractor shall supply at his own cost representative samples to the Engineer of the aggregates he intends using, together with certificates from an approved laboratory indicating that the aggregates comply with the specifications. Approximately 50 kg of each sample of aggregate shall be supplied.

PSG3.5 **ADMIXTURES**

The use of admixtures will be subject to the approval of the Engineer. The information listed in Subclause 3.5.1 shall be provided.

In addition, all water retaining structures will include admixture as specified.

Add the following new sub-clause to G 3:

PSG3.9 Materials for movement joints

PSG3.9.1 General

The various jointing materials, the manufacturers of the materials and the methods of application shall be as approved by the Engineer. Materials shall be stored and protected to avoid damage, degradation, distortion or contamination.

The joint materials shall be resistant to ultraviolet light and to biological degradation.

PSG3.9.2 Water stops

Water stops shall be of approved manufacture and of the pattern and the material and widths scheduled and specified and shown on the drawings. They shall comply with the tolerances specified in Subclause 6.1. They shall conform to Specifications CKS 388 or 389, for natural rubber or PVC respectively.

All intersections between water stops shall be prepared by mitring and welding/vulcanising intersection pieces in the factory in accordance with the manufacturer's instructions and to approval of the Engineer. Only straight lengths of water stop may be field welded using the appropriate jigs and tools.

Where required, water stops shall have eyelets so that they may be tied securely to the adjacent reinforcement. "Rearguard"-type water stops shall have flanges or cleats that grip effectively.

PSG3.9.3 Fillers

Closed cell expanded polyethylene fillers shall be pre-cut to suit the application with a tear-out strip for forming the specified recess for the sealant. If so, required the filler shall be glued into position with an approved epoxy glue.

PSG3.9.4 Bond breakers, primers and sealants

The bond breaker (if specified) shall be self-adhesive PVC tape (or equal, approved material) with a width the same as the joint recess into which it is to be applied. The primer, if required for the sealant, shall be fully compatible with the sealing compound that is to be used.

The elastomeric sealant shall be either a two-component polysulphide liquid polymer base complying with the requirements of SABS 110 or a polyethylene-based polyurethane "pouring grade" for horizontal or near horizontal joints or "gun grade" for vertical/overhead joints and joints steeper than 1 in 10 to the horizontal. All elastomeric sealants shall comply with BS 4254 Type A1 and shall have a movement tolerance of 25%.

PSG4 PLANT

PSG4.3/4.4 Mixing plant and vibrators

Stand-by mixers and vibrators of adequate capacity and with an independent power unit shall be maintained on site for immediate use in the event of breakdown of the regular mixers or vibrators or failure of the power supply.

PSG4.5 Formwork

PSG4.5.3 Formwork ties

The use of sleeves for formwork ties through the walls of water-retaining structures will not be permitted. Ties, when cast in, shall have some form of positive anchorage to prevent any rotation when loosening formwork.

For watertight concrete structures the shutters shall be fastened using an approved imbedded fastening system. Open ferrules will not be permitted in the reservoir.

Add the following new sub-clause to G 4.5:

PSG4.5.4 Formwork: chamfers and fillets

All exposed external angles in concrete work shall have 20 mm x 20 mm chamfers unless otherwise specified or ordered, but the top edge of a slab that is to receive an applied finish shall not be chamfered.

Internal corners in concrete work need not have fillets unless such fillets have been specified on the drawings or ordered by the engineer.

PSG4.5.5 Water-bath

A temperature-controlled water-bath with a capacity to cure two hundred cubes shall be provided on site. The water-bath shall be located under cover.

PSG5 CONSTRUCTION

PSG5.1 Reinforcement

PSG5.1.2 Fixing

Fixing of reinforcing bars by welding and heating of bars will not be permitted.

PSG5.1.3 Cover

In Subclause 5.1.3(a) amend the words "bar or stirrup" to read: "bar, secondary reinforcement, stirrup, tying-wire knots or wire ends".

Tying wire may not encroach on the specified minimum cover by more than a single strand thickness.

Add the following new sub-clause to G 5.1:

PSG5.1.6 Spacers

Spacers of approved design include approved plastic or other proprietary spacers, or purpose made precast mortar blocks.

Where mortar blocks are used, they shall be properly shaped so as not to slip out of position and shall be made of the same mix as the mortar of the concrete in which they are to be placed. The mortar shall be well compacted by approved means into the moulds to result in blocks with a density of at least 2 300 kg/m³ and which are free from honeycombing. The mortar blocks shall be cured in water for at least 7 days. Blocks which have not been manufactured and cured strictly in accordance with these requirements or which are in any other way considered unsatisfactory by the Engineer, will be rejected and shall be removed from the Site.

PSG5.2 Formwork**PSG5.2.1 Classification of finishes**

Rough formwork Degree of Accuracy III may be used on the outside faces where concrete is more than 500mm below the final ground level.

PSG5.2.5 Removal of Formwork

The Contractor shall make provision for the continued support of beams and slabs while the formwork is being removed and/or for back propping of beams, slabs, etc. The propping may be required simultaneously on more than one level directly underneath one another. The requirements for continuous propping and/or back propping shall be calculated to a theoretical model that is acceptable to the Engineer, and details shall be submitted for the Engineer's approval. Data required for such calculations, e.g. design loads and structural dimensions, will be supplied by the Engineer on request.

PSG5.2.6 Special smooth finish (Additional sub-clause).

All concrete surfaces that will be exposed above the final ground levels shall have a special smooth finish to a Degree of Accuracy I. The formwork used shall be high-grade, unblemished and regular in size. Formwork ties shall be placed in a regular pattern. The special smooth finish shall be an off-shutter finish to the concrete such that no after treatment is required other than at the positions of formwork ties.

PSG5.2.7 Construction Loads (Additional sub-clause).

The contractor shall not impose any construction loads which overstress the shaft walls, allowing for the age of the concrete at the time of loading and the design loads as shown on the drawings. Where necessary, propping shall be carried through more than one

pour lift with the props placed as per approved lifting formwork by temporary works designer.

PSG5.5 Concrete

PSG5.5.1.1 General

The concrete mix design for strength concrete must be prepared in an approved laboratory and the results of actual test mixes must be submitted for approval together with 7-day and 28-day strength test results. Special attention is drawn to the fact that the concrete mix must provide a very dense and impervious concrete.

The concrete shall also be tested for water sorptivity, oxygen permeability, chloride conductivity, depth of cover and shrinkage.

No concrete shall be cast until the mix designs have been approved by the Engineer. The Engineer may call for revised mix designs at any stage during the Contract.

Any mix for use in the wall or floor of a water-retaining structure shall have a water/cement ratio not exceeding 0,5, shall contain not less than 375 kg cement per cubic metre of concrete and the proportions of the various aggregates shall be such as to produce a density of at least 2 400 kg/m³. For concrete containing PFA the maximum cement content shall be 450 kg/m³.

In order to facilitate increasing the workability of concrete in the fresh/plastic state, to ensure watertightness without increasing the water/cement ratio, the Engineer may approve the use of an additive.

The workability of concrete shall be assessed by means of the slump test. The slump of each batch of concrete shall be taken and recorded directly before casting.

PSG5.5.1.4 Chloride content

With reference to Table 4, efflorescence will not be acceptable on any exposed concrete surface.

PSG5.1.5 Durability

The exposure conditions for concrete are classified as "Severe".

Add the following values to table 5:

"The maximum water/cement ratio for moderate sections, general water retaining reinforced concrete, exterior portions of mass concrete, as well as for internal concrete in buildings under conditions of moderate exposure, is 0,50.

The maximum water/cement ratio for concrete slabs on the ground under very severe conditions, is 0,45."

PSG5.5 Concrete

PSG5.5.1.7 Strength concrete

Unless otherwise specified on the drawings or in the Schedule of Quantities, all structural concrete shall be Grade 40 MPa watertight concrete.

In the design of the concrete mix, special attention must be given to the fact that concrete is to be used in a water retaining structure and should therefore be a very dense mix.

PSG5.5.2 Batching

Batching of strength concrete shall be by mass. Prescribed concrete may be batched by volume.

PSG5.5.2.2 Water

"The accuracy of the measurement of water shall be within 2% of that required. Water for curing concrete shall not contain impurities in sufficient amount to cause discolouration of the concrete or produce etching of the surface.

No water shall be added on site to ready mix concrete prior to placing to improve workability. All concrete delivered to site shall be checked for workability using the slump cone test and slump measured outside of the limit set from the design mix shall be rejected.

Water samples from the intended source of supply shall be taken for analysis before any concrete work is commenced, and at monthly intervals throughout the duration of the contract. If the samples are unacceptable the contractor shall either change a supply or take steps to improve the existing source, as approved."

PSG5.5.2.4 Additives (Additional sub-clause).

Approved additives shall be batched by equipment having a suitable mechanical/electrical interlock device which prevents under or over dosage of the mix.

PSG5.5.3.2/7.3 Ready-mixed concrete

Concrete from a central concrete production facility other than on the construction site will be permitted and, apart from test results in terms of 7.3.1, 7.3.2 and/or 7.3.3, test results obtained by such a production facility as part of its quality control system will be accepted for evaluation in terms of Subclause 7.3.4, provided they are stored and cured on site.

PSG5.5.5 Placing of concrete

Structural concrete shall not be cast directly against the side of any excavation without the use of formwork unless prior approval has been obtained in writing from the Engineer.

Concrete used in pipe trenches for encasement may be cast directly against the side of the excavation. Concrete for thrust/anchor blocks shall be cast directly against the side of the excavation.

The casting procedure shall be submitted to the Engineer for approval at least 14 days prior to the start of casting.

After vibration, the concrete shall be spaded in corners, in angles and against forms to release air bubbles which may have been trapped in these positions.

PSG5.5.5.10 Size of Cast (Additional sub-clause)

"In establishing the size of anyone cast the contractor shall give due consideration to, and will be solely responsible for, defects which may arise from drying shrinkage, heat of hydration, or bleeding of the concrete, unless such defects flow from construction procedures stipulated by the Engineer to which the contractor has objected in writing".

a) Instrumentation of large concrete pours for foundation footing

"The contractor is required to model the effects on large members of temperature increases as a result of cement hydration during production and curing of concrete and use measures to prevent thermal cracking".

For all large concrete pours water tower base and cable anchorage structures, thermocouples shall be installed in the concrete in the centre of the pour and close to the outside surfaces to monitor temperatures during the hydration process. The type, installation method, fixing and location of the thermocouples shall be shown in a method statement which shall be submitted to the engineer 28 days before concreting of the element is proposed. Concrete placing shall not proceed until the approval of the engineer has been given and the suitability of the proposed equipment has been demonstrated by tests. The thermocouples shall be held in position in a robust manner to avoid damage or movement during concreting operations.

Temperatures within the concrete shall be recorded for each thermocouple at regular intervals and sufficient frequency from the time of placing until such time as the temperature difference between the centre and the edges of the pour is clearly established as a falling trend. The temperature difference between the centre and the edges or between any two thermocouples, unless it can be shown that this difference is not critical to the Integrity of the concrete, shall not exceed 22° C. The rate of monitoring can be reduced once it has been demonstrated that the above requirements can be met for all subsequent similar pours. The maximum temperature at any location within the pour shall not exceed 70° C.

Where it is shown from the monitoring that temperatures are excessive or that temperature differences are too high, adequate measures shall be undertaken to reduce these to acceptable levels. To avoid damage to the permanent works concrete being subjected to such unacceptable temperature effects, trials shall be undertaken in advance of permanent works concrete placing to ascertain temperature generation levels likely using the proposed concrete materials storage methods, water cooling, mixing, placing, heat insulation and curing methods".

b) Field Trial Mixes

Add the following

At least 35 days before the commencement of concreting, trial mixes shall be prepared under full-scale site conditions. Trial mixes shall be made on each of 3 days; the workability shall equate to the designed target value. Six cubes from each mix shall be taken, three for test at 28 days and three for test at 7 days. Further the trial mixes shall be made if the range (the maximum minus the minimum of the three cube results in any batch) exceeds 15% of the average of that batch, or if the range of the three batch averages exceeds 20% of the overall average of the batches.

The mixes shall be tested to determine the following properties:

- Workability
- Plastic density
- Water/cement ratio
- Bleeding
- Compressive strength at 7 and 28 days
- Hardened density
- Durability

Acceptable values for the limits of these properties shall be established during the trials, which shall be used to monitor the quality control of the mixes and set the standards of compliance. The average 28-day compressive strength of the three cubes produced for each trial mix shall exceed specified characteristic strength by at least 8 MPa."

c) Temperature and Hydration of Concrete

Add the following

The temperature of concrete delivered to the point of placement shall be within the range 10° C to 30° C. Concrete which has a temperature outside of this range shall not be placed in the structure. The rate of hydration of the cement in the concrete shall be such that the concrete can be placed and properly compacted within 2 hours after the addition of water to the mix ingredients. The initial set of the concrete shall not be unduly delayed due to inappropriateness of admixtures or cement type, which could promote bleeding."

PSG5.5.7 Construction joints

PSG5.5.7.1 General

The edge of joints, exposed to view in the finished structure, shall be formed with suitable beads to provide a straight edge true to line and level.

All joints, other than expansion, contraction and other movement joints, shall be treated as follows:

- a) As soon as practical, but not before 15 hours after placing, the construction joint surface shall be prepared to receive fresh concrete. This preparation, as specified in 5.5.7.3(a) to (d), shall be such as to remove all laitance or inert material which may have formed and the specified chipping or sand blasting shall be such as to produce a roughened surface all over.
- b) When concreting is interrupted concrete surfaces shall be protected from the sun as specified in Subclause 5.5.8(d) or by means of hessian kept damp until concreting is resumed. The Engineer is to be informed immediately when an interruption occurs in the casting of the concrete.
- c) All constructional joints (both designated and non-designated, see PSG2-3), (i.e. all joints other than movement, contraction and expansion joints) shall be dealt with as specified in Subclause 5.5,7,3.
- d) Unless construction joints between designated joints shown on the drawings are authorized by the Engineer in writing, concrete in the floor and wall shall be cast continuously between the designated joints shown on the drawings.

Add the following to sub-clause G 5.5.7.3:

d) Construction joints in water retaining structures:

The surface of the concrete shall be brushed with a steel wire brush or chipped with a light hammer or bush hammer or sprayed with a high-pressure water jet within 24 hours of casting to remove all laitance and fine particles to a depth of at least 10mm and to expose the coarse aggregate embedded in sound concrete. Whichever method is used to expose the coarse aggregate the Contractor shall ensure that the green concrete is not damaged or disturbed during the preparation of the joint and that water stops are not damaged.

After the reinforcement for the next pour has been fixed and the formwork erected, the construction joint shall be cleaned thoroughly with a pressurised water jet. The joint shall then be wetted continuously with water for 24 hours to completely saturate the concrete immediately before new concrete is cast. Before the new concrete is cast all excess water shall be removed from the construction joint and the new concrete shall be cast directly onto the prepared surface.

PSG5.5.7.4 Formed joints (Additional sub-clause)

Each joint shall be formed as shown on the drawings, complete with shear key rebates, waffle formwork, V-feature, water stops, "Flex cell" or equal, approved joint filler, dowel bars and their PVC tubes, etc. as indicated.

a) Construction joints in walls

All construction joints in the water retaining walls and footing shall be cast with water stops. Water stops shall be 2mm thick HDPE strips. Payment shall be per linear meter. The rate shall include supply and casting in of the water stop.

b) Construction joints in roof slabs

Construction joints in the roof slab are permitted. The position of these joints shall be approved by the Engineer. Again, these joints shall be cast against a vertical shutter leaving a 10mm deep x 5mm wide recess which is sealed on both sides with "Sikaflex-11 FC" one-part elastic joint sealant (or similar approved) to the Engineers approval.

The payment unit shall be for the linear metre. The tendered rate shall include the supply and casting-in of the water-stop, the sealant and the forming and preparation of concrete at the joint all inclusive.

c) Construction joints (horizontal) in the walls

Construction joints in the walls are permitted. Allowable positions of these joints are shown on the drawings or shall be to the approval of the Engineer.

The waterproofing bandage shall be applied on both sides with "Sika Combiflex SG20" (or similar approved) to the Engineers approval. "SIKA water bars V20" or similar approved 200mm wide PVC water-stops are required. All water-stops shall be heat-weld jointed on site strictly in accordance to the manufacturer's specifications.

The payment unit shall be for the linear metre. The tendered rate shall include supply and casting-in of water-stop, the sealant and the forming and preparation of concrete at the joint all inclusive.

d) Expansion and contraction joints

Expansion and contraction joints shall be constructed as detailed on drawings using PVC or rubber water stops. Water stops extruded from recycled material shall not be permitted.

Prior to bandaging, concrete surfaces shall be scabbled with a mechanical scabbier and water jetted with a 120-bar water jet. All joints shall be butt jointed and patched over.

The waterproofing bandage shall comprise of two elements:

- i. A 2 mm thick Hypalon strip (350 mm wide for expansion joints and 250 mm wide for contraction joints)
- ii. A 1 mm x 60 mm stainless steel strip with polythene backing bond breaker to the detail shown on the drawing,

The bandage shall be applied by coating the concrete and underside of the hypalon bandage with an epoxy adhesive, The stainless-steel strip is first positioned over the joint and the bandage with epoxy adhesive placed over the stainless-steel strip. All trapped air shall be eliminated by hand rolling the bandage until the epoxy is fully cured.

Payment shall be per linear meter. The rate shall cover all costs for the supply and application of water stops and bandaging including the installation of the stainless-steel strip.

Expansion and contraction joints shall be formed true to line in smooth formwork.

All surfaces shall be thoroughly cleaned of all accretions of concrete or other foreign matter by scraping or other approved means.

Particular care shall be taken to compact the concrete around water stops, edges, etc.

PSG 5.5.7.5 Non-designated joints (Additional sub-clause)

Any non-designated joints shall be identical to designated joints, as shown on the drawings, which would be used in similar positions and perform the same function.

PSG 5.5.7.6 Joints between footings or floors and walls or columns (Additional sub-clause)

Construction joints between foundations, footings or floors and walls, columns or piers connected to them, shall not be made flush with the supporting surface, but shall be made at a distance above the footing or floor shown as on the drawings or approved by the Engineer. The "kicker" shall be cast as an integral part of the foundation, footing or floor.

PSG 5.5.7.7 Application of primers and adhesives (Additional sub-clause)

The concrete to which the primer or adhesive is to be applied shall be dry and shall be cleaned of all dust, grit, grease, surface laitance and foreign matter by compressed air and/or water, solvents, or other suitable approved means. The Contractor shall provide

on Site an approved moisture meter to measure the degree of dryness of the joint. This meter shall be made available to the Engineer for testing. The joint shall be approved for the application of the primer and adhesive if the moisture content of the concrete is less than or equal to 5%. It may be necessary to dry the concrete surfaces locally by means of a gas torch or other approved manner.

PSG 5.5.7.8 Installation of water stops in joints (Additional sub-clause)

Water stops shall be held in the formwork so as to prevent air pockets forming underneath them. Special precautions shall be taken to the approval of the Engineer, to ensure that all flexible water stops are in perfect contact with well compacted void-free concrete. The Contractor shall provide satisfactory supervision of such vital operations.

PSG 5.5.7.9 Installation of joint filler in expansion joints (Additional sub-clause)

Joints in the filler shall be neatly butted so as to exclude mortar from the joint. Edges of filler strip against water stops, concrete, formwork, projections, etc., shall also be closely fitted to exclude mortar, so that there is no resistance (other than the compression of the filler) to the expansion movement for which the joint is designed. Joint filler shall be fixed to the first cast of concrete with an approved adhesive and as directed by the engineer.

PSG 5.5.7.10 Application of joint seals (Additional sub-clause)

Rebates shall be cleaned as required by PSG5.4.5 and shall be inspected and approved by the Engineer's representative before filling.

Joint sealants and primers shall be applied strictly in accordance with the manufacturer's instructions. Flow and non-slumping grades shall be used for horizontal and vertical joints respectively.

Only skilled workmen, experienced in this type of work shall be employed to apply the sealant.

Immediately after the compound is applied the joint shall be protected against damage until completion of the Contract.

PSG 5.5.8 Curing and protection

a) Base footing and Floor and Slab

Abovementioned structural elements shall be protected with approved plastic sheets that comply with the requirements as specified below immediately after the prescribed surface finishing has been completed. When the concrete has gained sufficient strength to prevent damage to the surface thereof, the plastic sheets shall be removed on a regular basis to allow the application of more water to the concrete to ensure that it is kept moist continuously. Plastic sheets shall be reinstalled after each wetting of the concrete. The curing period shall be at least 10 days.

b) Walls

Structural elements other than horizontal elements, such as walls, shall be thoroughly sprayed with water immediately after the removal of form work. Immediately after this the concrete shall be covered with approved plastic sheets. These shall be removed on a regular basis to allow the application of more water to the concrete to ensure that it is

kept moist continuously. Plastic sheets shall be reinstalled after each wetting of the concrete. Above mentioned shall be cured by means of this method for at least 10 days.

Plastic sheets used for curing shall be waterproof and may not be torn or otherwise discontinuous. It shall be white or lightly coloured. Black or other dark coloured plastic sheets shall under no circumstances be allowed. Sheets shall be held down or fixed securely to the elements being cured and joints in sheets shall be taped to prevent loss of moisture from the concrete. Care shall be exercised to prevent staining of exposed concrete.

Notwithstanding the preceding specifications, the Contractor shall also ensure that the concrete shall not be exposed to thermal shocks during the first 28 days after casting and he shall take the necessary, additional precautionary measures to shield the concrete with plastic sheets or hessian during extreme warm, cold or windy weather conditions. Hessian shall be wetted should the conditions necessitate this. Curing methods shall be such that saturation and subsequent damage to soil foundations is prevented.

The Contractor shall make allowance in his rates for the above-mentioned curing methods. Where the Contractor fails to cure for a minimum of 10 days, no payment shall be made for the relevant pour of concrete and the Engineer may demand the removal and replacement of such concrete.

PSG5.5.9 Adverse weather conditions

No placing of concrete shall take place if the ambient temperature is below 5°C, or exceeds 32°C, or is likely to drop below 5°C or rise above 32°C during the casting period or within eight hours after casting is completed. If concrete is to be cast during times of high ambient temperature or hot drying winds, the Contractor shall be responsible for taking the necessary steps to keep the placement temperature as low as possible. Such steps include the spraying of the coarse aggregate with water, the painting of silos with reflecting aluminium paint, the insulation of tanks and pipelines, and the protection of concrete ingredients against the direct rays of the sun. The area of the pour shall be shaded before and during concreting and the concrete shall be shaded from the time of mixing until eight hours after placing.

Windbreaks shall be erected if necessary.

PSG5.5.10 Concrete surfaces

PSG5.5.10.4 Screeded finish (Additional sub-clause)

After placing and compacting, the concrete on a top (unformed) surface shall be struck off with a template to the designated grades and tamped with a tamping board to compact the surface thoroughly and to bring mortar to the surface, leaving the surface slightly ridged but generally at the required elevation. No mortar shall be added, and noticeable surface irregularities caused by the displacement of coarse aggregate shall be made good by re-screeding after the interfering aggregate has been removed or tamped.

PSG5.5.10.1 (a) Wood-floated finish.

Where wood-floating is ordered or scheduled, the surface shall first be given a finish as specified in PSG5.6.1 and, after the concrete has hardened sufficiently, it shall be wood-

floated, either by hand or machine, only sufficiently to produce a uniform surface free from screeding marks.

PSG5.5.10.1 (b) Steel-floated finish

Where steel-floating is specified or scheduled, the surface shall be treated as specified in PSG5-6.1 except that, when the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the screeded surface shall be steel-trowelled under firm pressure to produce a dense, smooth, uniform surface free from trowel marks.

PSG5.5.11 Watertight concrete

The floor, roof, columns and walls of the reservoir shall be constructed using watertight concrete. The Contractors shall abide by all conditions set out in sub-clause 5.5.11 and pay particular attention to this aspect of the works. The formwork/shutters shall be fastened using an approved imbedded fastening system. Open ferrules will not be permitted in the reservoir. No extra item shall be scheduled for payment under this sub-clause and the costs thereof shall be covered by the formwork and concrete rates.

PSG5.5.13 Grouting

"Unless otherwise specified on the drawings, grout for grouting holding down bolt pockets, column base plates or similar shall consist of either.

- i) an approved proprietary non shrink grout (without metallic aggregate), or
- ii) a 2:1 sand cement grout mixed as dry as possible consistent with placing conditions.

Grout designated as dry packed shall be of such a consistency that it can be properly compacted by ramming. Where compaction by ramming is not possible, a proprietary flowable grout must be used. Grout shall have a minimum compressive strength at 28 days of 20 MPa".

a) Water

Water for grout shall comply with the requirements given in Sub-clause 3.3 of SANS 1200 G.

b) Aggregates

Notwithstanding the requirements of Sub-clause 3A.1 of SANS 1200G, the grading of fine aggregates and) and coarse aggregate (stone or pea gravel) shall conform to the gradings given in Tables 1 and 2 respectively:

Table 1	
Test sieve normal aperture size (mm)	% passing (By Mass)
9.5	100
4.75	95-100
1.18	46-65
0.39 (300 um)	5-15
0.15 (150 um)	0-5

Table 2	
Test sieve normal aperture size (mm)	% passing (By Mass)
9.5	100
4.75	95-100
2.36	0-5

c) Cement

Cement shall be ordinary Portland cement complying with the requirements of SANS 471.

d) Admixtures

Admixtures shall comply with the requirements of Sub-clause 3.5 of SANS 1200 G and shall have a proven record of satisfactory performance. All admixtures are to be approved by Engineer.

e) Proprietary grouting materials

Unless otherwise approved by the Engineer, proprietary grouting materials shall be obtained ready mixed in sealed pockets as supplied by the manufacturers.

PSG5.5.14 Defects

All defects shall be repaired as soon as possible after the formwork has been removed and the Engineer has inspected the concrete. A statement of the method to be used for each repair shall be submitted to the Engineer for his approval before any work is carried out. The Engineer may prohibit the further placing of concrete in the particular area concerned until he is satisfied that the repair has been satisfactorily executed.

All honeycombing shall be repaired by cutting back to solid concrete and patching with a suitable epoxy mix to the approval of the Engineer.

PSGS.S.1S.a. Concrete records

For each casting the contractor shall keep records of:

- (a) Time elapsed between mixing and casting of concrete
- (b) Time elapsed between batches cast
- (c) Slump test results of each batch

PSGS.S.1S.16 "No-fines" concrete (Additional sub-clause)

A nominal aggregate size of 19 mm shall be used in the manufacturing of "no-fines" concrete. No fines concrete shall be laid under where specified and shall consist of coarse aggregate, cement and water only. No fine aggregate shall be used.

The concrete shall be mixed in the following proportions:

- Cement - 50 kg
- Aggregate - 0,40 m³
- Water - 22,5 e

The specified depth of the no-fines concrete shall be cast in one pour.

Between 24 and 48 h after the no-fines layer has been laid it shall be covered with a 1:4 cement: sand mortar layer 20 mm thick. The mix shall be comparatively dry to ensure that it does not penetrate and block the cavities in the no-fines concrete. The surface

shall be steel floated to form a plane surface. The mortar skim shall be cured in the same manner as concrete for a period of not less than 2 days.

Payment shall be per cubic metre of no-fines concrete placed. The rate shall include compaction and skimming to the approval of the Engineer.

PSGS 5.17 Items to be cast in or grouted into concrete (Additional sub-clause)

PSGS 5.17.1 Casting pipes and specials in concrete

Where entry holes for pipes/specials have been provided in the walls, the Contractor shall be responsible for the concreting in of such pipes/specials regardless of whether or not these have been supplied by himself.

The Contractor is responsible to ensure watertight fittings in the concrete to the Engineer's approval.

PSG 5.17.2 Fixings for equipment supplied under separate contract

a. The Contractor will be responsible for the forming of pockets if applicable to holding down bolts for equipment supplied under a separate contract. Holding down bolts will be supplied by and positioned by others.

b. After casting of the concrete all shuttering shall be removed and the sides of the bolt holes and surface on which the machine base is to be placed shall be scabbled to remove all defective concrete, laitance, dirt, oil, grease and loose material.

c. Upon completion of the positioning and alignment of equipment and when instructed by the Engineer the Contractor shall in collaboration with the mechanical contractor, grout up pockets and baseplates by filling pockets and voids under the baseplates with an approved non-shrink grout.

PSG 5.17.3 Fixings for items supplied under this Contract

Holding down bolts or other fixings required for the installation of items supplied under this Contract shall be provided by the Contractor. These fixings shall be cast in or grouted into pockets or installed by other means as approved by the Engineer.

Where anchor bolts are used which are installed into holes drilled into concrete or masonry these shall be of a type approved by the Engineer. All such bolts used shall be manufactured from stainless steel or a metal with a resistance to corrosion equal to that of grade 304 stainless steel. The metal used for bolts shall be compatible with galvanized mild steel.

Anchor bolts shall have minimum pull-out forces and minimum ultimate lateral loads at least equal to those specified below:

Specified Anchor Size	Minimum Pull-out Force (kN)	Minimum Ultimate Lateral Load (kN)
M6	10,35	7,60
M8	13,70	11,15
M10	19,44	15,95
M12	31,85	26,90
M16	50,45	45,80
M20	60,50	71,20

PSG 5.18 Supervision

Prior to carrying out any concrete work, the Contractor shall obtain the approval of the Engineer in respect of:

- Structural programme
- Description of casting sequence
- Concrete plant details
- Materials to be used in concrete
- Details of concrete
- Construction joints

PSG7 TESTING**PSG7.1.2 Frequency of sampling**

One sample shall consist of three concrete test cubes.

For each sample taken the position in the structure shall be recorded where the batch represented by that sample is placed.

Sampling of concrete of a particular grade shall be as specified in Subclause 7.1.2 with the following frequency of sampling referred to in Subclause 7.1.2.2 being amended to read as follows:

"A minimum 2 samples for 50 m³ (or less) of pour shall be taken for each grade cast on any day."

PSG7.2.4 Early-Strength Testing

7-day tests shall be performed on 1 sample for 50 m³ (or less) of pour. These results shall be submitted to the Engineer as soon as possible after testing.

PSG7.4 Grouting (Additional sub-clause)

The Contractor shall, where so ordered, carry out a site test for each grouting procedure and each grouting gang to be used. The tests shall be carried out on a dummy bedplate similar in configuration to that which is to be grouted, but not exceeding 1 m² in area unless otherwise ordered. When the dummy bedplate is dismantled, the underside shall show a minimum grout contact area of 80% with reasonably even distribution of the grout over the surface grouted except that, in the case of expanding grout, the minimum grout contact area shall be 95%. The test shall show evidence of good workmanship and materials and the results shall be to the satisfaction of the Engineer.

The Contractor shall, when so ordered, make standard test cubes from various grout mixtures and also subject them to compression tests to determine whether the specified strength has been achieved. Test procedures shall comply with the relevant requirements of Subclauses 7.2.1 to 7.2.3.

PSG7.4.1 Concrete properties

Acceptance criteria for concrete properties are stated below.

PSG7.4.1.1 Water sorptivity and oxygen permeability

Table PSG 7.3.6.1 Water Sorptivity and Oxygen Permeability

Table PSG 7.3.6.1 Water Sorptivity and Oxygen Permeability		
	Test No./Description/Unit	
Acceptance Category	Water Sorptivity (mm/h)	Oxygen Permeability (log scale)
Concrete made, cured and tested in laboratory	6	>10
Full acceptance of in-situ cast concrete	< 8	> 9.15
Conditional acceptance of in-situ cast concrete (with remedial measures)	8.0 - 15	8.75 - 9.15
Rejection	> 15	<8.75

PSG7.4.1.2 Chloride conductivity

Table PSG 7.3.6.2 Chloride Conductivity (severe to very severe conditions)								
Concrete	100% PC		10% CSF		30% FA		50% GGBS	
Curing Period	28d	90d	28d	90d	28d	90d	28d	90d
Full we cured	1.25	1.00	1.50	0.45	1.50	0.40	1.25	1.00
Moist cured (3 - 7d)	1.75	1.60	1.60	0.55	2.25	1.25	2.25	2.00

PSG7.4.1.3 Concrete cover

Table PSG 7.3.6.3 Concrete Cover			
Test Description	Specified cover (mm)	Specified Range	
		Minimum	Maximum
Concrete cover to reinforcement	20.00 - 30.00	As specified	As specified + 5mm
	30.00 - 80.00	As specified	As specified + 10mm

PSG8 MEASUREMENT AND PAYMENT**PSG8.1.1 Formwork****PSG8.1.1.7 Edges of blinding layer or "no-fines" concrete (Additional sub-clause)**

No separate payment will be made for formwork to the edge of the blinding or "no-fines" concrete (refer to PSG5-10) layer. The rates tendered for concrete to the blinding or "no-fines" concrete layer shall cover the cost of such formwork.

PSG8.1.1.B Kickers

Unit: m2

No separate payment will be made for formwork to the edges of kickers. The rates tendered for successive walls or columns formwork shall cover the cost of such formwork,

PSG8.1.1.1 & 8.1.1.2 Chamfers and fillets.

No additional payment will be made for chamfers and fillets up to 40 mm wide. Larger fillets and chamfers will be measured by length in accordance with Subclause 8.2.5.

PSG8.1.2.2 & B.1.2.3 Reinforcement

Unit: ton

Notwithstanding the method of measuring and paying for reinforcement specified in Subclauses 8.1.2.2 and 8.1.2.3, reinforcement will be measured and paid for as scheduled.

PSG8.1.3 Concrete

Unit: m3

The rates for concrete shall also cover:

- a) the use of dolomitic aggregate where prescribed,
- b) the cost of the preparation of design mixes by an approved laboratory and submission for approval by the Engineer (see PSG5-3.1),
- c) the cost of non-designated joints (see PSG2-4),
- d) screeded finish of unformed surface as specified,
- e) inclusion of admixtures where specified, and
- f) necessary admixtures to ensure watertight concrete.

PSG8.1.4 No-fines concrete

Unit: m3

No-fines concrete (refer to PSG5.5.15.16) will be measured by volume.

The rate shall cover the cost of supplying materials, constructing and placing in position the no-fines concrete, and shall include for the steel floated 20 mm mortar skim.

PSG8.4.4 Unformed surface finishes

Unit: m2

The rates for unformed surface finishes shall cover the cost of providing the respective surface finish as specified in PSG5-6.

PSG8.5 Joints

Only designated joints as shown on the drawings will be measured for payment according to the length of each type of joint constructed (see PSG2.4.3). The rate shall cover the cost of all materials, labour and plant required to construct each type of joint specified on the drawings, including the cost of all shuttering, treatment of the joint as specified in Subclause 5.5.7.3, the provision of chamfers as specified where concrete is exposed, as well as testing and repairing where necessary.

Non-designated joints will not be measured for payment.

PSG8.5.1 Formed joints

Unit: m2

Formed joints will be measured by the plane area of the joint.

The rates shall cover the cost of all operations and materials specified in Subclause 5.5.7 and PSG5.5.7.4, and detailed on the drawings such as joint filler, dowel bars and tubes, bitumen coats, etc., but excluding water stops or water bars.

	Water stops and water bars will be measured by length separately for each type.	
PSG8.5.2	Holding down bolts	Unit: No.
	Fixing of holding down bolts will be measured by number. The rate shall cover the cost of all things necessary to ensure that the bolts are effectively and rigidly held in position during casting, complete with sleeved pockets, all as detailed on the drawings.	
PSG8.7	Grouting	Unit: m3
	Grouting of base plates and equipment bases will be measured by the volume of grout used.	
	The rate shall cover the cost of the supply and floating in of grout under the plates to ensure solid and complete filling of the gap.	
PSG8.9	Items cast in concrete	Unit: No.
	Items cast in concrete will be measured by number separately for each type of item.	
	Notwithstanding Subclause 8.2.6, the rate shall cover the cost of fixing in position and casting in the item as construction proceeds, irrespective of whether the Contractor chooses to fix the item in the formwork and cast it in directly or to box out a hole and grout the item in subsequently.	
	The item will be measured and paid separately.	
PSG8.10	Precast concrete cover planks	Unit: m2
	Precast paving slabs will be measured by the area paved.	
	The rate shall cover the cost of compacting the area, application of weed-killer, supplying, laying and bedding the slabs, grouting the joints and filling any gaps, all as specified.	
PSG8.11	PFA concrete	
	Measurement and payment for PFA concrete shall be as specified in Subclause 8.1.3.	
	The tendered rate shall cover all costs in connection with the supply, storage, handling on site and mixing in of PFA.	
PSG8.12	Poly-urethane sealants	Unit: m
	A one-part polyurethane sealant shall be used in the outside joint between the reservoir roof and walls to the details shown and shall be finished off neatly leaving a smooth regular finish.	
	Payment shall be per linear metre. The rate shall include the supply, preparation, sealing and finishing.	
	PSGS.13 Manhole covers	Unit: No.
	Manhole covers shall be paid per unit.	
PSG8.14	Commercial Laboratory	Unit: Prov Sum

A Provisional Sum for the services of a commercial laboratory has been included in the Bill of Quantities for the Engineer's Acceptance Testing. The use of this laboratory is for additional testing required over and above the testing specified in SANS 1200 G and the variations to SANS 1200 G specified above. Testing shall only be paid on written instruction for additional testing from the Engineer.

The procedure for sampling and manufacturing, storing, curing and testing cubes shall be in accordance with SABS 863.

PSGA 8.1.3 Concrete

a) Concrete will be measured net to the dimensions shown on the drawings or to the dimensions cast, whichever are the smaller. Structural elements that are undersized will be measured for payment only if they are accepted by the Engineer

b) No allowance will be made for concrete required to make up overbreak in soft excavation, but payment will be made for additional concrete or formwork, or both, ordered in writing by the Engineer to replace unsuitable material or overbreak in hard rock or in intermediate excavation.

The unit rates shall cover the cost of the provision of concrete (made with ordinary Portland cement unless otherwise scheduled), mixing, testing, placing, compacting, the forming of stop-ends and unforeseen construction joints, striking of for levelling as applicable, and curing and repairing where necessary, together with the cost of all parts of formwork in contact with the concrete and the necessary bearers, struts, and other supports, plus the layout and plant necessary to erect and strike such formwork.

Payment shall be made upon receipt of 21 day concrete test results.

PSH1 SCOPE

This specification covers the execution of work entailed in structural steelwork generally for buildings and other structures. It covers the basic materials, the quality, manufacture, tolerances in workmanship, testing and the methods by which the finished structure is to be measured for the purposes of the payment.

PSH 3 MATERIAL**PSH 3. 6 Bolts, nuts and washers**

All site connections are to be bolted unless otherwise specified. The *Contractor* is to supply all bolts including chemical anchors used as holding down bolts. Site bolts are to be suitably bagged and labelled. Bolt grades are to be as follows, unless specifically noted on the drawings:

Structural Connections : Grade 8.8 M20 with 22 mm diameter holes

Hand railing, Stair Tread Connections : Grade 4.8 M16 with 18 mm diameter holes

HSFG Connections : Grade 8.8S M24 tightened by the "turn-of-the-nut method".

PSH 5 CONSTRUCTION**PSH 5. 1 Drawings and shop details****PSH 5. 1. 1 Design drawings**

The *Engineer's* drawings will include a general arrangement of the proposed structure indicating all structural member sizes and special connections. For standard types of connections, specific design loadings will be indicated and shall be sufficiently comprehensive to allow the detailing of these connections. If no specific loadings are supplied, it should be assumed that:

- For cross-bracing members, the connection shall be designed to carry the full tension capacity of the member, unless otherwise noted.
- For compression bracing members, the connection shall be designed to carry the compression capacity of the member taking cognisance of the effective length of the member, unless otherwise noted.

To assist the Fabrication *Contractor* in the preparation of shop fabrication details, the *Engineer* can provide an electronic copy of the drawings in AutoCAD 2007 format. Electronic drawings are issued in good faith, and it is the responsibility of the *Contractor* to ensure they are not in conflict with the issued hard copy drawings (which take preference). No claims in this respect will be entertained.

PSH 5. 1. 2 Contractor provides shop details

The *Contractor* is responsible for producing all shop drawings for the project.

Connections shall be designed per the following:

- No eccentricities in connections are permitted unless shown on the *Engineer's* drawings, or as requested by the *Contractor* and approved by the *Engineer* in writing. Should approval be given for eccentric connections, the *Contractor* is to design these connections to resist the secondary effects of these eccentricities.

- For angle connections, bolts are to be placed on the standard back mark position, which is to correspond with the centreline shown on the *Engineer's* drawing.
- The *Contractor* must ensure that suitably qualified and experienced technical staff are employed to undertake the design and draughting of connections.
- The *Contractor* shall ensure that details that are likely to initiate corrosion are avoided.

The *Contractor* shall, at his own expense, prepare and submit one copy of shop drawings of all fabricated work, working or setting out drawings, shop details and schedules to the *Engineer* for review by the *Engineer*, and fabrication of such work shall not be performed by the *Contractor* until such acceptance has been confirmed.

Unless otherwise agreed with the *Engineer*, shop drawings shall be complete in every respect, prepared to show all details of fabrication and erection of all components and assemblies. All shop drawings must be submitted with issue slips, clearly stating the drawing number and revision of each shop drawing.

The *Engineer* will generally only review member sizes regarding the general arrangement and correct implementation of the design on the detail drawings. Responsibility for design and dimensional accuracy of connections not fully detailed on the *Engineer's* drawings remains the responsibility of the *Contractor*. Acceptance by the *Engineer* relates to conceptual adequacy, and does not absolve the *Contractor* of his obligations and responsibilities in this regard. The *Engineer* will retain a copy of the drawing and it will be returned to the *Contractor* within 7 working days with the *Engineer's* comments or acceptance. Shop details must be accepted in writing by the *Engineer* prior to the commencement of fabrication.

PSH 5.4 Setting out

Concrete work to support the steelwork shall be constructed by the main structure *Contractor*. The structural steel *Contractor* shall, before commencing erection check all holding down bolts for deviation from line and level and report in writing to the *Engineer* any deviations which fall outside the tolerances specified. Commencement of erection shall infer acceptance of the holding down bolts and concrete work as constructed or remedied.

The *Contractor* shall agree with the main Engineer on the proposed method of fixing the holding down bolts.

PSH 5.5 Erection

PSH 5.5.1 Procedure

The *Contractor* shall submit for the *Engineer's* review a method statement describing the proposed erection procedure.

PSH 5.6 Grouting of supports

PSH 5.6.2 Bedding- of Stanchions in Foundation Pockets.

Chemical anchor bolts for fixing steelwork to concrete elements shall be installed in accordance with the manufacturer's recommendations for hole diameter, depth of embedment and tightening torque.

PSH 6 TOLERANCES

PSH 6.1 General

PSH 6.1.1 Verification of dimensions

Where modifications or extensions are made to existing structures, all relevant dimensions are to be checked on site before commencing fabrication drawings or fabrication.

PSH 7 TESTING

PSH 7. 1 Test certificates

The *Contractor* shall supply manufacturer's test certificates pertaining to the steel to be used to the *Engineer* on a regular basis.

PSH 7. 3 Inspection and testing of welds**Additional Sub clause**

Non-destructive testing of welds is required to be performed per AWS D1.1 by suitably qualified and competent personnel. All test procedures techniques and acceptance criteria are to be as specified in AWS D1.1. The following are specifically required by the *Engineer* as a minimum:

Visual Inspection	: All welds
Dye Penetrant Tests	: 10% of all welds
Magnetic Particle Tests	: 10% of all base plate welds
UT or X-Ray Tests if permitted by the <i>Engineer</i>	: 10% of the length of all butt welds and all site welds

Welds not satisfying the acceptance criteria are to be repaired accordingly at the *Contractor's* account.

PROJECT SPECIFICATIONS**C4.2: VARIATIONS AND ADDITIONS****TO STANDARDIZED SPECIFICATIONS****SABS 1200 HC: CORROSION PROTECTION OF STRUCTURAL STEELWORK****PSHC1SCOPE**

This specification covers the execution of work entailed in the corrosion protection of structural steel. It covers the basic materials, the quality, manufacture, tolerances in workmanship, testing and the methods by which the finished structure is to be measured for the purposes of the payment.

PSHC 3 MATERIAL**PSHC 3. 1 Packaging**

Where a manufacturer's product is specified, generic alternatives shall not be used without the *Engineer's* prior written approval.

PSHC 5 CONSTRUCTION (EXECUTION OF WORK)**PSHC 5. 4 Preparation for Coating****PSHC 5. 4. 1 General**

Preparation of the steelwork and application of the coating system shall take place at an approved location.

PSHC 5. 4. 2 Removal of Contaminants

After fabrication, but prior to any form of preparation, all steelwork shall be washed down and cleaned to remove grease and other contaminants.

PSHC 5. 4. 3 Methods of Preparation**PSHC 5. 4. 3. 1 Abrasive Blast Cleaning**

The required standard of blast cleaning, measured in terms of ISO 8501 -1: 1998, is specified with the coating system.

PSHC 5. 6 Cleaning of Surfaces about to be Coated

Within four hours of preparation, the substrate shall be cleaned of all dust and the first coat of the coating system shall be applied

PSHC 5. 7 Coating Systems

Tables of Coatings:

PREPARATION OF STEELWORK	METHOD : SABS 064 STANDARD : ISO 8501-1:1998 - Sa 2½	
COAT	PAINT TYPE	DFT
Primer	Inorganic Zinc Silicate with minimum 85% zinc in the dry film	75-100 µm
Intermediate	Recoat able MIO Epoxy	75-150 µm
Finish	Water borne Acrylic	40-70 µm

All coating systems are to be applied in strict accordance with the manufacturer's instructions. Equivalent products from other manufacturers of the same generic types may be used with written approval of the *Engineer*.

PSHC 5. 8 Application of Paint Coatings

After erection, repair any damage and apply the finishing coats specified in the coating system.

The method of coating application shall be strictly in accordance with the manufacturer's recommendations.

There shall be a colour contrast between successive coats.

All bolts, nuts and washers shall be primed and painted as specified for the steelwork.

No painting on site shall be carried out in inclement weather or when humidity or frost is liable to cause wet or damp conditions on the surfaces to be painted.

PSHC 5. 9 Application of Metal Coatings

Hot dip galvanising shall comply with the requirements of SABS 763.

All bolts, nuts and washers shall be hot dip galvanised.

Flame cutting and welding of galvanised members will not be permitted.

Holes may be drilled through galvanised members only with the *Engineer's* written approval in each case, and the exposed steel shall be made good as specified in Sub clause PSHC.2.6.2.

PSHC 5. 10 Repair of Damaged Coatings

All items of steelwork shall be examined on site, before and after erection, for damage to coatings.

Damaged areas shall be repaired in accordance with Clause 5.10.

Where approved site cutting or welding are required, the area for a distance of about 50 mm on either side of the cut shall be cleaned of all coatings, the cutting or welding carried out, the weld de-slugged, all flux and weld spatter removed, the steelwork ground down to "white metal" and coated as specified above.

PORTION 2: VARIATIONS AND ADDITIONS TO**STANDARDISED SPECIFICATIONS****SANS 1200 SW: FENCING****PSW 1 TECHNICAL SPECIFICATION FOR THE CONCRETE PALISADE FENCE****PS SW 1.1 SCOPE**

To Supply, deliver and install a new concrete Palisade fence at wastewater pump stations.

The bidder must submit a project plan and a plan of action; for example, indicate the method/s to solve situations on the ground such as rocky (granite rocks), sandy, clayey formation etc.

PS SW 1.2 SITE SURVEY

The bidder is to determine the site conditions before pricing. The bidder is to determine, prior to commencing work, the location of all underground services such as water, electricity and communication pipes or lines by engaging an authorized service locator, the cost of which is to be borne by the contractor.

PS SW 1.3 AREA CLEANING

The bidder must provide for cutting down of trees and shrubs on both sides of the proposed fence. This must be done 5 m on both sides of the fence (Total = 10 m).

Maximum height of remaining stump should be 100 mm above ground level.
The bidder should provide for site cleaning such as removal of rubbles.

PS SW 1.4 CONCRETE PALISADE SPECIFICATIONS

This is a typical concrete palisade fence.

PS SW 1.4.1 POST

- 3600 x 225 x 140 mm, tapering to 80 mm at the front.
- Two holes to take load bearing rails.
- Reinforcement: Pre-stressed steel 6x4 mm Crimp wires grade 1550/1700 MPa,
- Stressed to 75% of U.T.S. end cut ground level and sealed with an Epoxy.

PS SW 1.4.2 PALES

- 2370 x 75 x 100 mm, tapering to 80 mm at the front.
- Two holes to take bolted connection.
- Reinforcement: Pre-stressed steel 4x2.65 mm Crimp wires grade 1550/1700 MPa,
- Stressed to 75% of U.T.S. end cut ground level and sealed with an Epoxy.
- Top edge angle: 45 degrees from back to front.

PS SW 1.4.3 RAILS

- 4000 x 80 x 150 mm with 18 x 10 mm holes to take 8 mm carriage type galvanized bolts.
- Reinforcement: Pre-stressed steel 4x4 mm Crimp wires grade 1550/1700 MPa,
- Stressed to 75% of U.T.S. end cut ground level and sealed with an Epoxy.
- Fixing of pales to rails: M8x140 electro galvanized carriage bolts.

PS SW 1.4.4 CONCRETE GENERAL

- All components are off shutter finished with back wood floated.
- All reinforcement bars should be located to ensure a concrete cover of 20 mm.
- The concrete strength of all pre-stressed components is a minimum of 40 MPa and
- Foundations 15 MPa, both at 28 days.

PS SW 1.4.5 RAZOR WIRE

- Barbed wire shall have a barb spacing of maximum 12,5 mm, and shall comply with CKS164. The wire shall be single strand 2.5 mm spring steel with class A galvanizing.
- All the coils must be securely tied to the extension arms with 1.6mm galvanized steel wire at each post.
- Each 700 mm circle of razor wire must be securely tied to the steel strand using 1.6 mm galvanized wire.

C3.6.2 PARTICULAR SPECIFICATIONS

The following Particular Specifications for work not covered by the SANS 1200 Standardized Specifications are also included hereunder:

STANDARD SPECIFICATIONS FOR MECHANICAL WORKS (INCL. GENERAL WORKS)

- [PSB1.1 ENVIRONMENT](#)
- [PSB1.2 GENERAL](#)
- [PSB1.3 DESIGN](#)
- [PSB1.4 INSTALLATION](#)
- [PSB1.5 MATERIALS](#)
- [PSB1.6 CASTINGS](#)
- [PSB1.7 FABRICATION OF CARBON STEELS](#)
- [PSB1.8 FABRICATION OF STAINLESS STEELS](#)
- [PSB1.9 WELDING](#)
- [PSB1.10 CORROSION PROTECTION : APPLICATION AND CONTROL](#)
- [PSB1.11 CORROSION PROTECTION: SURFACE PREPARATION](#)
- [PSB1.12 CORROSION PROTECTION: METAL COATINGS](#)
- [PSB1.13 CORROSION PROTECTION: PAINT COATINGS](#)
- [PSB1.14 FASTENERS](#)
- [PSB1.15 ANCHOR FASTENERS](#)
- [PSB1.16 GRID FLOORING](#)
- [PSB1.17 GUARD RAILING](#)
- [PSB1.18 PERMANENT LADDERS AND STAIRS](#)
- [PSB1.19 PIPEWORK](#)
- [PSB1.20 FLANGES](#)
- [PSB1.21 FLEXIBLE PIPE COUPLINGS](#)
- [PSB1.22 CONDENSATE TRAPS FOR SEWAGE GAS](#)
- [PSB1.23 FLAME ARRESTERS](#)
- [PSB1.24 PRESSURE RELIEF AND VACUUM BREAKER VALVE WITH FLAME ARRESTER](#)
- [PSB1.25 VALVES FOR LIQUIDS OR GASES](#)
- [PSB1.26 CHECK VALVES](#)
- [PSB1.27 AIR VALVES](#)
- [PSB1.28 PENSTOCKS](#)
- [PSB1.29 VALVE ACTUATORS](#)
- [PSB1.30 BASEPLATES](#)
- [PSB1.31 GUARDS](#)
- [PSB1.32 ELECTRIC MOTORS](#)
- [PSB1.33 POWER TRANSMISSION](#)
- [PSB1.34 MACHINE VIBRATION LEVELS](#)
- [PSB1.35 NOISE CONTROL](#)
- [PSB1.36 THERMAL LAGGING](#)
- [PSB1.37 BEARINGS](#)
- [PSB1.38 LUBRICATION](#)
- [PSB1.39 SCREW PUMPS](#)
- [PSB1.40 CENTRIFUGAL PUMPS](#)
- [PSB1.41 SUBMERSIBLE AND IMMERSIBLE PUMPS](#)
- [PSB1.42 DRAINAGE PUMPS](#)
- [PSB1.43 POSITIVE DISPLACEMENT PUMPS](#)
- [PSB1.44 METERING PUMPS](#)
- [PSB1.45 PUMP SUCTION STRAINERS](#)
- [PSB1.46 VERTICAL SHAFT MIXERS](#)
- [PSB1.47 SUBMERSIBLE MIXERS](#)
- [PSB1.48 SCREW CONVEYORS](#)
- [PSB1.49 INSTRUMENTATION](#)
- [PSB1.50 MAGNETIC FLOWMETERS](#)
- [PSB1.51 GUAGES](#)
- [PSB1.52 CHLORINATION SYSTEMS](#)
- [PSB1.53 CONTROL SYSTEMS](#)
- [PSB1.54 SCADA SYSTEMS](#)
- [PSB1.55 CONTRACTOR'S DRAWINGS](#)
- [PSB1.56 TUITION](#)

[PSB1.57 OPERATING INSTRUCTIONS](#)

[PSB1.58 INSTALLATION, OPERATION AND MAINTENANCE MANUAL](#)

[PSB1.59 INSTALLATION, OPERATION AND MAINTENANCE MANUAL](#) CONTENTS

[PSB1.60 STARTING, SITE TESTING AND COMMISSIONING OF PLANT](#)

PART B2 - PARTICULAR MECHANICAL SPECIFICATIONS

PSB2.1: General

PSB2.2: RBC Rotors and Motors

PSB2.3: Pumps and miscellaneous Steel Pipework

PSB2.4: Chlorine Handling and Dosing Equipment

PSB2.5: Miscellaneous

PLDW DEWATERING AND DESLUDGING – TENDER SPECIFICATIONS

PLLN : PARTICULAR SPECIFICATIONS FOR GEOMEMBRANE LINING

PLM PARTICULAR SPECIFICATIONS FOR ELECTRICAL WORKS

PLRA PARTICULAR SPECIFICATIONS FOR REMOVAL OF ASBESTOS SHEETS

PLRC PARTICULAR SPECIFICATION FOR REPAIRS OF CONCRETE WORKS

PSF: PARTICULAR SPECIFICATION: SOCIAL FACILITATION

PLSS PARTICULAR SPECIFICATIONS FOR ROOFING SHEETS AND SIDE CLADDING

PARTICULAR SPECIFICATION FOR MECHANICAL WORKS**PSB 1 STANDARD SPECIFICATIONS FOR MECHANICAL WORKS (INCL. GENERAL WORKS)****PSB1.1 ENVIRONMENT**

The General Mechanical Specification shall apply wherever it is relevant to the Contract unless it is superseded in accordance with the precedence stated and, in particular, by the Detailed Specification.

PSB1.2 GENERAL**PSB1.2.1 Wastewater Treatment Works**

For the purposes of this Specification all Wastewater Treatment Works shall be regarded as severe environments with some industrial pollution.

This environment is very corrosive to ferrous metals and, where the use of such metals cannot be avoided, the metals must be adequately protected, such protection systems being designed for a life of at least 15 years.

Sewage gas is also present throughout the treatment works and this may contain hydrogen sulphide which, in addition to being corrosive to ferrous metal, is also corrosive to most non-ferrous metals. **The effect on copper alloys can be particularly severe, often with disastrous effects on the reliability and life of switchgear, control systems, slip-rings, etc. Such equipment must therefore be adequately sealed and protected.**

PSB1.3 DESIGN**PSB1.3.1 General**

This Specification lays down the performance, quality, and overall system requirements of the Works. Deviation from the Specification will only be considered if the Engineer considers such deviation an improvement.

PSB1.3.2 Safety

Safety shall be an all-important and overriding consideration and proper attention shall be paid to this aspect at the design stage. The regulations of the Occupational Safety and Health Act 2005, as amended, shall be strictly observed.

Equipment which is potentially dangerous shall be designed in accordance with a relevant South African or international Standard.

The following must be noted:

- (a) Hazards must be avoided or guarded. Nip points shall be guarded; sharp corners shall be rounded off; operating handles, supports and protrusions shall be kept clear of access ways; and so forth.
- (b) The Contractor's Drawings and specifications shall clearly specify the structural requirements of the Works and the Contractor shall be responsible for covering all unsafe gaps and openings left in structures after installation.
- (c) Moving parts shall be properly guarded to the satisfaction of the Engineer.
- (d) An emergency stop button shall be installed in a convenient position next to each machine. The installation shall be designed to provide immediate access without the danger of accidental operation. In addition, trip wires which will stop the driving motor when pulled shall be provided along the accessible side/s of moving conveyor belts, chains and the like irrespective of operating speed and irrespective of guards provided.

Where, in the opinion of the Engineer, an installation is not safe, the Contractor shall remedy such defect at his own cost to the satisfaction of the Engineer.

PSB1.3.3 Design Factors

A high-quality standard is demanded and reliability, long-life, trouble-free operation, efficiency, ease of maintenance and operation, and neatness are essential.

All plant and equipment shall be of robust construction and the design shall, as applicable, be based on:

- (e) the full range of duties which can be reasonably anticipated.
- (f) the power and torque transmitted by the driver system under full load and stalled conditions.
- (g) the maximum pressure or vacuum which can be produced by pumps, blowers and compressors under all conditions including blocked or closed inlet and outlet circuits.
- (h) conservative service and safety factors based on approved standards or laid down in the printed specifications of reputable and approved manufacturers.
- (i) a safety margin of at least 20% in addition to any service or safety factors which apply.
- (j) twenty-four hour per day operation.
- (k) a minimum life of 100 000 hours before repair or major part replacement.
- (l) prevention of serious damage from normal operational problems such as blockages, blinding, jamming, seizure, malfunction and, as far as is practical, maloperation, if these occurrences cannot be avoided by good design.

Machines with non-overloading characteristics shall be selected wherever possible, eg: motors shall be sized so that they cannot be overloaded by the driven machine.

PSB1.3.4 Fail-Safe Operation and Protections

Where damage can occur from normal operational or other foreseeable problems, plant, equipment and systems must be designed to be fail safe, i.e. must have built-in redundant elements, or be fail-to-safe; i.e. must return to a safe condition where no further damage can be done in the event of a failure, malfunction, maloperation, and overload and, as far as practical, misuse. All reasonable and economically justifiable protections to prevent or limit damage to plant and equipment, particularly in high-risk situations, must be incorporated. Protections shall:

- (a) be directed at the source of the problem, limit forces to safe levels and act quickly enough to prevent damage (electrical thermal type overloads are inadequate);
- (b) stop or prevent from starting all equipment at risk.
- (c) activate an alarm with a labelled indicator on the control panel whenever a protection operates.
- (d) not permit unauthorised tampering.
- (e) operate reliably after long inactive periods exposed to corrosive and dirty conditions.

Tenderers shall highlight equipment limitations which can be exceeded during operation and cannot be guarded against.

PSB1.3.1 Moving Parts

The following general requirements apply not only to machines but to all equipment with moving parts such as headstocks, extension spindles, swivelling davits, heavy duty hinges, pivots and the like:

- (a) All rotating or swivelling shafts, pins and the like, shall be adequately supported, guided and restrained by lubricated or self-lubricating bearings, collars and/or bushes.
- (b) Swivelling joints on linkages and the like shall be of the "universal" or fork and rod type with bearings or bushes fitted to the eyes or forks.
- (c) On abrasive applications abrasion resistant materials and slow speed operation shall be utilised. Raw sewage and sludge shall be regarded as very abrasive.
- (d) All applications associated with wastewater shall be regarded as corrosive and materials of construction shall be selected to suit.
- (e) Susceptibility to fatigue failure shall be minimised by proper design and manufacturing procedures. Changes in section shall be radiused and care must be taken to avoid the use of welded components in areas of fluctuating stress.
- (f) The locking of nuts and pins in position shall be done to the approval of the Engineer.
- (g) Wearing parts shall be designed for interchangeability and ease of removal and replacement.

PSB1.3.2 Arrangement and Mounting

The arrangement and general design shall take the following requirements into consideration:

- (a) Lifting eyes, lugs, hooks, etc., shall be provided on heavy or large items to facilitate handling.
- (b) Castings or fabrications shall have machined pads for seating and be mounted on either soleplates or baseplates as appropriate.
- (c) Where accurate alignment is required, positioning pins and/or jacking screws shall be provided.
- (d) The needs of operation and maintenance including neatness, access, working space, safety, cleaning, adjustment, handling, assembly, alignment, disassembly, removal, etc.
- (e) With plant and equipment to be mounted on or against concrete or brick structures built by others, provision shall be made for adjustment in the mechanical design. Any special accuracy requirements must be specified on the Contractor's Drawings.

PSB1.4 INSTALLATION**PSB1.4.1 General**

The Works shall comply with the following:

- (a) When erected and installed, the plant and equipment shall be of neat and workmanlike appearance, solidly and evenly supported, true to line, level, plumb and in proper working order.
- (b) The requirements of Sub-clause "Arrangement and Mounting" (see Clause "Design") must be noted.
- (c) The Contractor shall provide all foundation bolts, supports, hangers, brackets, etc. required for the support and fixing of his equipment.
- (d) The Contractor is responsible for grouting puddle pipes which pass through liquid retaining walls or slabs and for all other grouting necessary for all plant and equipment.
- (e) The use of more than three shims in the alignment of equipment will not be permitted. Machined spacers shall be prepared where necessary. Shims and spacers shall be of a corrosion resistant material such as stainless steel.
- (f) Corrosion protection requirements shall be carefully attended to and the relevant paragraphs of Sub-clause "Paint Application" (see Clause "Corrosion Protection: Paint Coatings") must be noted. All mating faces must be coated before and sealed after assembly.
- (g) Fastener threads must be coated with a nickel-based, anti-seize compound before assembly.
- (h) Crevices which are formed between two surfaces shall be filled, prior to final fastening, with a suitable formable packing, Denso tape or equivalent. This applies particularly to stainless steel.

PSB1.4.2 Alignment of Shafts

Shafts for drives, such as motors, with an output above 150 kW shall be aligned to the driven shaft as follows:

- (a) Final alignment shall be done after installation and before commissioning, shall be checked in the presence of the Engineer and shall be to his approval. Alignment shall be sufficiently accurate to ensure that no initial pre-load is placed on the shaft coupling.
- (b) Each motor shall be aligned to its pump using laser aligning equipment with real time computer display.
- (c) The use of pourable epoxy resin chocks (Epocast 36, Chockfast or equivalent) shall be acceptable. If pourable chocks are used, the baseplate feet do not have to be machined but each machine foot shall be provided with a screw for vertical alignment. The chock thickness shall not be less than 20 mm.

PSB1.5 MATERIALS**PSB1.5.1 Materials - Generally**

All materials used in the manufacture and construction of plant and equipment shall be new, unused and shall be the best of their respective kinds. The Contractor shall ensure that the materials are selected in accordance with the best engineering practice to suit the working conditions and the extremely corrosive environment.

PSB1.5.2 Steel

All structural steel shall comply with the requirements of SABS 1431 grade S 355 JR and shall be legibly marked with the maker's name or trademark and identification marks.

PSB1.5.3 Stainless steel

The AISI grade of stainless steel to be used will normally be specified in the Detailed Specification. Unless otherwise specified, rolled material shall be supplied with a matt, annealed and pickled or otherwise de-scaled surface finish. For wrought steels, the equivalent BS 970 grade may in each case be used. The common applications are as follows:

<u>APPLICATION</u>	<u>AISI</u>	<u>BS 970</u>
Wastewater Treatment Works (all applications):		
welded	316L	316S12
not welded	316	316S16
Low corrosion interior:		
welded	304L	304S12
not welded	304	304S15
Exterior and corrosive interior:		
welded	316L	316S12
not welded	316	316S16

A manufacturer's test certificate shall be provided for each batch of stainless-steel giving details of the material analysis and any mechanical tests carried out on the material. Each stainless-steel item supplied shall be clearly and permanently marked with the grade of stainless steel and cross-referenced to the applicable test certificate.

Where grades 316 and 304 are mentioned in the Tender Documents, these shall be taken synonymously with grades 316L and grade 304L, respectively.

PSB1.5.4 3CR12

This is the titanium stabilised, 12% chrome steel as produced by Columbus Stainless, South Africa.

3CR12 shall always be supplied with an annealed and pickled finish. 3CR12, in cases where it is to be coated, shall be suitably abrasive blasted to ensure adherence of the prime coat.

PSB1.5.5 Plastics

Thermoplastics and fibre reinforced polymers shall be UV resistant, have adequate tensile strength and high impact strength and generally suit the application.

PVC is regarded as too brittle and shall not be used unless called for in this Specification or approved in writing by the Engineer before supply.

PSB1.6 CASTINGS

Castings shall comply with the relevant South African or British Standard for the material used, including the following:

Grey Cast Iron Castings	-	SABS 1034	BS	1452
S.G. Iron Castings	-	SABS 936/7	BS	2789
Steel Castings (General Purpose)	-	SABS 1465	BS	3100
Aluminium Castings	-	SABS 989/992	BS	1490
Copper and Copper Alloy Castings	-	SABS 200	BS	1400

Particular attention shall be paid to cleanliness, soundness and neat fettling and dressing of castings. Surfaces shall be smooth and irregularities caused by mould washaways, and the presence of porosity and sand and slag inclusions will not be tolerated. Areas under bolt heads, nuts and washers, shall be machined or spot faced to ensure a flat and smooth pressure bearing area, and sufficient space shall be provided for the use of ring or socket spanners.

All pressure retaining castings shall be hydrostatically tested to not less than 1,5 times the maximum working pressure after machining and shall be pressure tight.

No repairs shall be undertaken to castings without the written permission of the Engineer and **welding will not be permitted on cast iron castings.**

Castings shall be heat treated to provide optimum corrosion resistance and toughness combined with reasonable machinability. In particular stainless-steel castings shall be heat treated so as to ensure that all carbides are in solution, to ensure optimum grain size, and to provide maximum corrosion resistance.

The Contractor shall provide a test certificate for each casting or batch of castings, except for those made of grey cast iron, giving details of the material analysis, the heat treatment and any mechanical tests carried out.

PSB1.7 FABRICATION OF CARBON STEELS**PSB1.7.1 Standards**

Steelwork shall be constructed fabricated and erected in accordance with SABS Standard Building Regulations, Chapter 6, "Structural Steelwork", and with SABS 1200H where applicable.

PSB1.7.2 Finish

Weld spatter and other protrusions shall be removed. Sharp edges shall be rounded to a radius of at least 2 mm.

PSB1.7.3 Requirements for Corrosion Protection

In addition to finishing requirements, the requirements of corrosion protection application shall be taken into consideration. All surfaces must be accessible for surface preparation and coating. Inaccessible pockets, open hollow sections or the like shall not be permitted except where hot-dip galvanizing (without painting) is called for. Surfaces which cannot be properly prepared after fabrication must be abrasive blasted and coated with a two-pack epoxy pre-weld primer before fabrication.

PSB1.7.4 Drawings

General and detailed fabrication drawings shall be submitted by the Contractor for approval by the Engineer. Full details of the welding procedures and standards which he proposes to use shall be shown on these drawings.

PSB1.7.5 Inspections

The Contractor shall arrange for the Engineer to inspect fabrications, including fabricated pipework, in the fabrication workshop and prior to corrosion protection.

PSB1.8 FABRICATION OF STAINLESS STEELS

The requirements regarding the fabrication of carbon steels apply to the fabrication of stainless steels as well. In addition, the following requirements apply to the fabrication of stainless steels:

- (a) Fabrication of stainless steels and 3CR12 shall follow the recommendations in "The Stainless-Steel User Manual" and "The 3CR12 Fabrication Guide" issued by Columbus Stainless. Only fabricators experienced with stainless steel will be considered acceptable. Such fabricators shall use permanently dedicated storage and fabrication areas and shall use machines, tools and handling equipment suited and permanently dedicated to this type of material.
- (b) Surfaces which become contaminated with steel or otherwise stained or otherwise marked to be of uneven colour, shall be cleaned by pickling or electro-cleaning rather than by grinding.

The Contractor shall arrange for the Engineer to inspect fabrications, including fabricated pipework, in the fabrication workshop.

PSB1.9 WELDING**PSB1.9.1 General Welding Requirements**

- (a) **STANDARDS:** Standards complying with good modern practice, and acceptable to the Engineer, shall be adopted. These include the following:

BS 5135 - Arc welding carbon and carbon manganese steelwork.
BS 4677 - Arc welding austenitic stainless steel pipework.
BS 2633 - Class 1 Arc welding of steel pipework.
BS 2971 - Class II Arc welding of steel pipework.
BS 806 - Design and construction of ferrous piping in connection with land boilers
(used for arc welding specification of all pipe flanges).

Welders shall be experienced competent artisans approved in accordance with BS 4872.

- b) **WELDING TO BE CONTINUOUS:** All welding shall be continuous on all sides of any joint unless otherwise approved in writing by the Engineer. No crevices will be permitted and where stitch welding has been approved by the Engineer, the crevices so left shall be sealed with an approved filling compound after priming but before further painting.
- (c) **WELD APPEARANCE:** Welding shall be free of blowholes and all welding flux shall be removed. All weld spatter and other sharp imperfections shall be removed prior to abrasive blasting. Prior to painting, weld beads with a surface irregularity exceeding 3 mm or with sharp crests having a radius under 2 mm shall be ground. Weld grinding must not be performed on 304L or 316L stainless steel, however, unless unavoidable.
- (d) **ITE WELDING:** Site welding shall be kept to a minimum and shall only be undertaken with the approval of the Engineer.

PSB1.9.2 Welding of Stainless Steel and 3CR12

- (a) **WELDING STAINLESS STEEL:** Stainless steels shall be welded strictly as recommended in "The Stainless-Steel User Manual" issued by Columbus Stainless.
- (b) **WELDING 3CR12:** 3CR12 shall be welded strictly as recommended in "The 3CR12 Fabrication Guide" issued by Columbus Stainless.
- (c) **TYPE OF STAINLESS STEEL:** Austenitic stainless steels to be welded shall be of the low carbon grade (i.e.: 304L, 316L, etc.).
- (d) **WELDING RODS:** The welding rods used shall be the most suitable for the metal and purpose. Type 309 stainless steel welding rods shall be used for welding 3CR12 unless otherwise approved in writing.
- (e) **WELDERS:** Only welders experienced with welding stainless materials shall be used.
- (f) **GENERAL:** All possible steps shall be taken to ensure maximum corrosion resistance and strength of the welds and welded material. Special care shall be taken to avoid prolonged heating. Welds shall be passivated. Discolouration and steel contamination must be removed by pickling or electro-cleaning as approved by the Engineer but should rather be avoided by taking the appropriate measures.

PSB1.10 CORROSION PROTECTION: APPLICATION AND CONTROL**PSB1.10.1 Painting Contractor**

Surface preparation and coating application shall be carried out by experienced industrial painting contractors who are fully equipped and staffed to do such work in their own covered premises strictly in accordance with the paint manufacturer's recommendations. Before proceeding with the corrosion protection coatings, the Contractor shall submit the name of the painting sub-contractor for approval by the Engineer.

PSB1.10.2 Site Work

Surface preparation and coating application shall not be done on Site except for minor repairs, for application of the final aesthetic coat, where specifically called for in the Detailed Specification or where permitted by the Engineer in writing.

PSB1.10.3 Systems to be used

- (a) **SYSTEMS:** The corrosion protection systems to be used on the plant and equipment will usually be specified in the Detailed Specification, but if not, the Contractor shall recommend a suitable system for approval by the Engineer. If doubt exists as to the system or colour to be used, the Engineer's requirements must be ascertained.
- (b) **ALTERNATIVE SYSTEMS:** Alternative systems superior to those specified may be used if approved in writing by the Engineer.
- (c) **ALL ITEMS TO BE PAINTED:** Except where otherwise specified, all metal surfaces shall be painted. This includes hot-dip galvanized items and metal-sprayed coatings. In the latter case the paint shall be in the form of a sealer. Details of approved painting systems to be used are given below.
- (d) **COATING APPEARANCE:** After installation on Site the finished paintwork must be neat, smooth, of uniform colour and to the approval of the Engineer.
- (e) **316 STAINLESS STEELS:** It is not usually necessary to paint 316 stainless steels. If corrosion of 316 stainless steel does occur and depending on the appearance or extent of the problem, the Engineer may call for pickling, electrocleaning, painting or replacement of the item at no additional cost. Painting may however be required if contaminated or stained surfaces cannot be properly cleaned or where stitch welding has been approved.

PSB1.10.4 Quality Control of Coating Application

- (a) **INSPECTION:** The Contractor shall arrange for the coating application on fabricated steelwork to be inspected throughout by the Engineer. The Engineer may approve inspections by an independent competent person (hereinafter called the Inspector) appointed by and at the cost of the Contractor. Inspections shall be adequate to ensure compliance with the Specification and shall be done at the following stages as a minimum:

Coating (Metal-Spray, Paint, etc.)

- ✦ After fabrication but before surface preparation.
- ✦ After surface preparation but before application of the first coat.
- ✦ After application of the final sprayed metal coating or after application of the paint primer or first coat (as applicable).
- ✦ After the final factory applied paint or sealing coat.

Hot-dip Galvanizing

- ✦ After fabrication but before hot-dip galvanizing.
- ✦ After hot-dip galvanizing.

Duplex Protection (Hot-dip Galvanizing and Coating)

- ✦ After fabrication but before hot-dip galvanizing.
- ✦ After hot-dip galvanizing but before application of the first coat.
- ✦ After application of the primer.
- ✦ After the final factory applied paint coat.

- (b) **WITNESSING OF INSPECTION:** If the coating is to be done in by an inspector other than the Engineer, the Contractor shall, nevertheless, arrange for the Engineer to witness the inspections at his discretion.
- (c) **INSPECTION REPORT:** A written report of the inspections, prepared by the Inspector and by both the Inspector and the Contractor, shall be submitted for appraisal by the Engineer before delivery of the equipment to Site.
- (d) **INSPECTOR QUALIFICATIONS:** Inspectors appointed by the Contractor shall hold an appropriate qualification from either the CISA, the SAIW or the SAQCC.
- (e) **IDENTIFICATION OF ITEMS:** Every item to be coated shall be identified by a welded or hard-stamped code. Records shall be maintained for each item.

PSB1.11 CORROSION PROTECTION: SURFACE PREPARATION**PSB1.11.1 Imperfections**

Welding shall be free of blowholes and all welding flux removed. All weld spatter, sharp edges and other imperfections shall be removed prior to abrasive blasting. Prior to painting, weld beads with a surface irregularity exceeding 3 mm or with sharp crests having a radius under 2 mm shall be ground. (Weld grinding must not, however, be performed on stainless steel). Areas to be painted shall be free of crevices. If the Engineer has permitted stitch welding in terms of Clause "Welding", crevices shall be filled with a compatible sealing compound after the priming coat has been applied.

PSB1.11.2 Abrasive Blasting

Before coating all surfaces shall be properly degreased and abrasive blast cleaned to an SA3 finish with a 40-65 µm surface profile to Swedish Standard SIS 055900 of 1967. The abrasive shall comply with paragraph 4.3.3 of SABS 064 and shall be free from all traces of oil, grease, foreign matter, and corrosive contaminants such as chlorides, etc. The prepared surface shall be given the first coat of the painting system within 4 hours after cleaning.

In instances where stainless steel and 3CR12 are to be painted, the surface shall be suitably abrasive blasted prior to primer application.

PSB1.11.3 Between Coats

Between coats or with previously painted surfaces in good condition, all traces of oils, greases, soluble salts and corrosive air borne contaminants shall be thoroughly washed from the surface to be painted using a detergent type cleaning agent, rinsed and dried. The previous coat shall then immediately be lightly sanded or otherwise prepared as recommended by the paint manufacturer, wiped clean, dried and painted. Solvents are not acceptable as a surface cleaning agent.

PSB1.11.4 Hot-Dip Galvanized Surfaces

Hot-dip galvanized surfaces to be painted shall be free from white rust and shall be cleaned with an approved water based galvanizing cleaner using non-metallic abrasive pads until a "water break free" surface is obtained. The surface shall then be thoroughly rinsed with clean potable water to remove all residues and dried immediately prior to painting. Where necessary to obtain adhesion a sweep blast of the surface shall be done after cleaning.

PSB1.12 CORROSION PROTECTION: METAL COATINGS**PSB1.12.1 General**

Fabrication of items to be protected by metal coatings shall be in accordance with SABS ISO 14713.

PSB1.12.2 Hot-Dip Galvanizing

- (a) **STANDARD:** Hot-dip galvanizing shall be done in accordance with SABS ISO 1461:1999 Hot-dip Galvanized Coatings on Fabricated Iron and Steel Articles.
- (b) **THICKNESS:** Coatings shall be to the thicknesses detailed in the Standard.
- (d) **PASSIVATION:** Hot-dip galvanized material which is to remain unpainted shall be passivated as specified in SABS 763. Items to be painted after hot-dip galvanizing shall be air dried and not passivated.
- (e) **WHITE RUST:** Hot-dip galvanized material shall be substantially free from white rust when it is erected on site. Stacking and storing shall at all times be done in a manner to prevent white rust forming.

- (f) **REPAIR:** Damage to hot-dip galvanizing caused by welding, grinding, etc. is not acceptable. The repair to hot-dip galvanizing damaged by handling or transport shall be done by cleaning the area and applying 3 coats of a zinc rich primer giving a dry film thickness of at least 100 μm and containing at least 94 % zinc in the dried film. If the opinion of the Engineer is that damage is excessive, such items will be rejected by the Engineer and shall be replaced by the Contractor at his own expense.
- (g) **WELDING:** Welding after hot-dip galvanizing is not acceptable.
- (h) **TEST CERTIFICATE:** The Contractor shall supply a galvanizer's guarantee or test certificate prior to installation.

PSB1.12.3**Sprayed Metal Coatings**

- a) **STANDARD:** Sprayed metal coatings shall be done in accordance with SABS 1391: Standard Specification for Thermally Sprayed Metal Coatings as amended below. The statements below apply to Part 1 of SABS 1391.
- b) **SYMBOLS:** The type symbol described in Table 1 of the Standard shall be used to specify material and thickness requirements in the Detailed Specification; i.e. AL for aluminium, Zn for zinc, followed by the minimum average thickness in microns.
- c) **THICKNESS:** The minimum coating thickness for both Aluminium and Zinc shall be 150 μm . Greater thicknesses may be specified in the detail specifications.
- d) **THICKNESS TESTING PROCEDURE:** The procedure laid down in Clauses 4.2.1.3 a(1) or b(1) of SABS 1391: Part 1 for the determination of the coating thickness shall not be regarded as sufficient. The thickness shall be checked on every surface plane at points not more than 300 mm apart for small articles and 500 mm for large articles, e.g. angles shall be checked along all 4 surfaces, channels along all 6 surfaces, pipes in 4 planes etc. The minus tolerance on thickness in isolated areas shall also not exceed -10% and such low areas shall not be larger than 50 mm in diameter.
- e) **PERIOD BETWEEN PREPARATION AND COATING:** For Clause 3.3 of SABS 1391: Part 1, the time between preparation and coating shall be shortened from 4 hours to 2 hours at any application area closer than 10 km from the coast.
- f) **SEALING:** Unless otherwise specified, all metal coatings shall be sealed immediately after metal-spraying using a suitable pre-treatment wash primer followed by coats of low viscosity sealant until absorption is complete. This shall be followed by a suitable topcoat system to give a smooth final finish. The various coatings used shall be as specified or, if not specified, shall be selected by the Contractor to suit the duty and submitted to the Engineer for approval. The final coat shall normally be applied on site after installation. Colours shall be as specified or as agreed with the Engineer. Depending on the application, the following systems are acceptable:

System 1

- ✦ Application of micaceous oxide pigmented polyamide cured epoxy to achieve a dry film thickness of 60-80 μm ; (Sigmarite Sealer, or equivalent).
- ✦ One coat of solvent borne modified acrylic coating to achieve a dry film thickness of 70 μm ; (Sigma Topacryl coating, or equivalent).
- ✦ One coat of solvent borne modified acrylic finish to a dry film thickness of 30-45 μm ; (Sigma Topacryl finish, or equivalent).

System 2

- Application of one coat of two component epoxy primer to a dry film thickness of 40 µm; (Intergard 269, Chemrite Carboline Rustbond Penetrating Sealer, or equivalent).
- Application of one intermediate coat chemical resistant vinyl copolymer to a minimum dry film thickness of 70 µm.
- Application of one coat of vinyl copolymer chemical resistant enamel to a minimum dry film thickness of 40 µm.

System 3

- Application of one coat of two component epoxy primer to a dry film thickness of 40 µm; (Chemrite Carboline Rustbond Penetrating Sealer, Intergard 269, or equivalent).
- Application of two coats of polyurethane enamel (twin pack) to a minimum combined dry film thickness of 70 µm.

PSB1.13 CORROSION PROTECTION: PAINT COATINGS**PSB1.13.1 Paint Selection**

- PAINT QUALITY:** Paint shall be of best quality, of approved manufacture and brand and comply with the requirements of the relevant SABS or BS specifications.
- COMPATIBILITY:** To avoid incompatibility between paint coats due to variations in formulation, the different coats in any one paint system shall be provided by the same manufacturer.
- CONFIRMATION OF SUITABILITY:** Contractors shall obtain confirmation from their paint suppliers that, when using their paints, the systems specified are technically correct and suitable for the application and the material being coated.

PSB1.13.2 Paint Application

- SURFACE PREPARATION:** All surfaces shall be properly prepared as specified in Clause "Corrosion Protection: Surface Preparation".
- PAINTING:** Paints shall be applied strictly in accordance with the manufacturer's instructions by tradesmen skilled in this class of work. Thinning of paint shall only be allowed for spray application and the manufacturer's recommended thinners shall be used.
- COATING OF HIDDEN AREAS:** Areas which will be inaccessible after erection and surfaces resting on floors shall receive the full paint system prior to erection. Mating or contact surfaces shall be prepared and primed and be brought together while the paint is still wet.
- ITEMS ENCASED IN CONCRETE:** Metal to be encased in concrete shall be painted externally up to 30 mm inside the concrete section, leaving the remainder bare so as to facilitate bonding with the concrete.
- CREVICES:** Crevices will not be permitted. Where unavoidable crevices are accepted by the Engineer, such crevices shall be filled with compatible filler after application of the priming coat.

- f) **PROTECTION OF MACHINED SURFACES:** Where painting of machined surfaces is not possible or advisable, these surfaces shall be coated with an approved proprietary anti-corrosion compound giving 12 months protection under operating conditions. Shaft ends and machined mating or mounting surfaces or pads shall be so coated and shall not be painted.
- g) **COATING THICKNESS:** The dry film thickness shall be measured using a non-destructive thickness gauge such as the "Mikrotest" or equivalent and shall comply with the Specification.
- h) **REPAIR:** Painted areas damaged during transportation, erection or any means whatever shall be repaired as follows - Rusted spots shall be removed and cleaned by means of a wire brush or emery paper to a bright metal finish and the surrounding paint which is still intact shall be feathered for a distance of 50 mm beyond the damaged area. Spot priming and repair shall consist of all the coats previously applied and shall overlap the undamaged area.
- i) **PROTECTION ON SITE:** Proper and adequate use of cover sheets and other means shall be made to protect the existing paintwork from damage and from metal dust and sparks when welding, grinding, and wire brushing on site. Similarly effective steps shall be taken to prevent spillage or splashing or other damage to floors, walls and equipment when painting on site and any damage or mess caused shall be corrected at the Contractor's cost.
- j) **FINAL COAT:** The final external coat/s shall always be applied on site after installation except for System A/1, where all coats shall be applied by a specialist applicator at his premises. A professional, smooth finish with a uniform colour is required.

PSB1.13.3 Final Colour Code - General

The final colour code, with the exception of projects for wastewater treatment works, shall be as follows:

PIPEWORK				
CONTENTS OF PIPE	BASIC COLOUR	COLOUR OF INDICATOR		
		1 BAND	2 BANDS	3 BANDS
AIR				
Compressed, Power	Arctic Blue (F28)		-	-
Aeration	Arctic Blue (F28)	Canary Yellow (C61)	-	-
Instrument	Arctic Blue (F28)	Salmon Pink (A40)	-	-
Vacuum	Arctic Blue (F28)	Primrose (C67)	-	-
Lime Transfer	Arctic Blue (F28)	Crimson (A03)	-	-
Backwash	Arctic Blue (F28)	Verdigris Green (E22)	-	-
CHEMICALS				
Aluminium Sulphate	Jacaranda (F18)	Verdigris Green (E22)	-	-
Sodium Aluminate	Jacaranda (F18)	Crimson (A03)	-	-
Ferric Sulphate	Jacaranda (F18)	Canary Yellow (C61)	-	-
Lime (dry powder)	Jacaranda (F18)	Salmon Pink (A40)	-	-
Activated Carbon	Jacaranda (F18)	Light Stone (C37)	-	-
Polyelectrolyte	Jacaranda (F18)	Cloud White (G80)	-	-
GASSES (other than air); liquefied or gaseous				
Butane, Propane	Light Stone (C37)	-	-	-
Ammonia	Light Stone (C37)	Ultramarine (F09)	-	-
Blast furnace	Light Stone (C37)	Crimson (A03)	-	-
Carbon Dioxide	Light Stone (C37)	Light Brunswick Green (H07)	-	-
Coke Oven	Light Stone (C37)	Light Grey (G29)	-	-
Producer	Light Stone (C37)	Verdigris Green (E22)	-	-
Chlorine, Hypochlorite	Light Stone (C37)	Canary Yellow (C61)	-	-

WATER				
Cold Drinkable	Brilliant Green (H10)	Cornflower (F29)	-	-
Hot Drinkable	Brilliant Green (H10)	Crimson (A03)	Cornflower (F29)	-
Boiler Feed (Distilled)	Brilliant Green (H10)	Crimson (A03)	Cloud White (G80)	Crimson (A03)
Boiler Feed (De-mineralised)	Brilliant Green (H10)	Cloud White (G80)	-	-
Industrial, Raw	Brilliant Green (H10)	Golden Yellow (B49)	-	-
Reclaimed	Brilliant Green (H10)	Jacaranda (F18)	-	-
Backwash	Brilliant Green (H10)	Light Stone (C37)	-	-
De-sludge	Brilliant Green (H10)	Canary Yellow (C61)	-	-
Stove Circulating	Brilliant Green (H10)	Salmon Pink (A40)	-	-
Hydraulic Power	Brilliant Green (H10)	Terra Cotta (A10)	-	-
Final Treated Effluent	Aquamarine (E67)	-	-	-
Interchange, Stage	Drakensberg Green (H36)	-	-	-
Raw Sewage	Olive Green (H05)	-	-	-
Sea Water	Light Brunswick Green (H07)	-	-	-
Primary Sludge	Dark Brown (B03)	-	-	-
Waste Activated Sludge	Light Brown (B15)	-	-	-
Digested Sludge	Light Brown (B15)	Light Olive Green (H21)	-	-
Pasteurised Sludge	Light Brown (B15)	Cloud White (G80)	-	-
OIL				
Diesel Fuel	Golden Brown (B13)	Cloud White (G80)	-	-
Hydraulic Power	Golden Brown (B13)	Salmon Pink (A40)	-	-
Lubricating	Golden Brown (B13)	Verdigris Green (E22)	-	-
Transformer	Golden Brown (B13)	Crimson (A03)	-	-
Paraffin	Golden Brown (B13)	Arctic Blue (F28)	-	-

PLANT AND EQUIPMENT	
EQUIPMENT	COLOUR CODE
FIRE FIGHTING	
Equipment and Pipework	Signal Red (A11)
ELECTRICAL	
Distribution Boards, Switch-Gear, Terminal Boxes and Conduits	Light Orange (B26)
Emergency Stop	Signal Red (A11)
MACHINE GUARDS	
Inside	Light Orange (B26)
Outside	Colour of Machine
Protruding Shafts, Exposed Gear Wheels and Rotating Parts	Light Orange (B26)
HANDRAILS	
Horizontal Rails and Chains	Golden Yellow (B49)
Stanchions	Black
Protrusion, Sides of Ramps	Black and Yellow Diagonal Stripes
GENERAL	
Scour Pipes	Deep Buff (B24)
Valves	Basic colour of pipeline
WORKSHOP FLOOR DEMARCATION	
Demarcation Lines	Golden Yellow (B49)
Working Areas	Pastel Grey (G54)
No Parking, No Storage	Golden Yellow (B49)
Aisles and Walkways	Brilliant Green (H10)
Storage Area	Terracotta (A10)
<i>Urethane based paint is to be used for concrete surfaces</i> <i>Traffic paint is to be used for tarred surfaces</i>	

PSB1.13.4 Final Colour Code - Wastewater Treatment Works

NO	APPLICATIONS	COLOUR	SABS 1091
A	<u>WATER APPLICATIONS</u>		
A1	Fresh water	Cornflower	F29
A2	Sea water	Light Brunswick Green	H07
A3	Cooling water	Aquamarine	E67
A4	Final treated effluent	Aquamarine	E67
A5	Fire fighting	Signal Red	A11
B	<u>SLUDGES</u>		
B1	Interchange	Drakensburg Green	H36
B2	Raw sewage	Light Olive Green	H21
B3	Primary sludge	Dark Brown	B03
B4	Waste activated sludge	Light Brown	B15
B5	Digested sludge	Light Brown with bands of Light Olive Green*	B15/ H21
B6	Pasteurised sludge	Light Brown with bands of Cloud White*	B15/ G80
C	<u>OTHER LIQUIDS</u>		
C1	Drainage	Black	-
C2	Hydraulic oil	Salmon Pink	A40
C3	Lubricating oil	Verdigris Green	E22
C4	Polyelectrolyte	Aquamarine/bands of Dark Violet *	E67/F06
C5	Diesel Fuel	Golden Brown	B13
D	<u>GASES</u>		
D1	Chlorine, Hypochlorite	Canary yellow	C61
D2	Digester gas	Smoke Grey	F20
D3	Air	Arctic Blue	F28
D4	Oxygen	Cloud White	G80
D5	Ventilation air	Pale Grey	G62
D6	Steam	Silver (Aluminium)	-
D7	Hydrogen	Poppy Red	A14

* Bands shall be 250 mm wide, 4m apart.

Hot liquid lines shall have a 50 mm wide band of Crimson (A03) every 4 metres.

Final Colour Code (continued)

NO	APPLICATION	COLOUR	SABS 1091
E	<u>ELECTRICAL EQUIPMENT</u>		
E1	Motors: External	Light Grey	G29
E2	Motors: Cowl; external and internal surfaces	Light Orange	B26
E3	Terminal boxes, Conduits	Light Orange	B26
E4	Emergency stop	Signal Red	A11
F	<u>MECHANICAL EQUIPMENT</u>		
F1	Pumps	To suit liquid being pumped	-
F2	Blowers, compressors, including ancillary equipment	Strong Blue	F11
F3	Turning shafts, couplings, pulleys, etc.	Light Orange	B26
F4	Baseplates	Black	-
F5	Direction arrows, Unit number, etc.	Black on white, white on other colours	-
F6	Valves	To suit liquid being handled	-
F7	Handwheels	Black	-
F8	Bridges for settling tanks	Light Admiralty Grey, or Arctic Blue	E46 F28
F9	Bulk mechanical equipment, gearboxes, general fabrications, brackets, supports, etc.	Light Grey	G29
F10	Cranes and crawl beams	Golden Yellow	B49
G	<u>DANGER AREAS</u>		
G1	Guards : External and internal surfaces	Light Orange	B26
G2	Turning shafts, couplings, pulleys, fans, etc.	Light Orange	B26
G3	Fire fighting	Signal Red	A11
G4	Protrusions, Low beams, etc.	Black/Golden Yellow Stripes	---/B49
G5	Handrails: Top horizontal and chains Bottom horizontal Stanchions	Golden Yellow Black Black	B49 - -

EXCEPTION:

Items made of 316 or 316L stainless steel may be left unpainted provided the surface is of uniform self-colour without blemishes, rust, marks or stains. If blemished the surfaces must either be painted or cleaned by pickling and/or electro-cleaning (not grinding or other mechanical means).

PSB1.13.5 Painting Systems**DEFINITION OF TERMS**

The abbreviation "d.f.t." used in this Specification shall mean dry film thickness given in microns and, except where otherwise specified is the minimum (not average) thickness permissible.

SYSTEM A/1

Three coats of a low solvent, high solids, polyamine/amide cured, epoxy (twin pack) to a minimum thickness of 350 µm.

Notes:

- The coating shall undergo holiday detection over the full surface in accordance with SABS 1217. This test shall be done by an inspector holding an appropriate qualification from either CISA, the SAIW or the SAQCC.
- When applied to hot-dip galvanized surfaces, a suitable epoxy primer shall be used after careful surface preparation before applying this system.
- This system shall be applied by a specialist applicator prior to delivery to site with particular attention to the required interval between coats.
- The first and third coats shall be a different colour to the second coat.

Applied to:

- Items subject to immersion and/or wet abrasion, e.g. screw pumps, clarifier rotating arms, scum boxes and weirs, pipework, chutes, tanks, etc.

SYSTEM**A/2**

System A/1, plus

1 Coat polyurethane enamel (twin-pack)

d.f.t = 350µm

d.f.t = 40µm

Total d.f.t = 390µm

SYSTEM**A/3**

3 Coats of a micaceous iron oxide pigmented polyamine/amide cured epoxy sealer/coating (twin pack) with d.f.t = 60 µm per coat. Total d.f.t = 180 µm.

Notes:

- Use Sigmarite Sealer, or equivalent.

Applied to:

- Hot dry applications up to 200 °C.

SYSTEM A/4

3 coats of a micaceous iron oxide pigmented polyamine/amide cured epoxy sealer/coating (twin pack) with a d.f.t = 80 µm per coat. Total d.f.t = 240 µm.

Notes:

- Use Sigmarite Sealer, or equivalent.

Applied to:

- Immersed applications in potable water up to 100 °C.

SYSTEM A/5

2 or 3 Coats polyamine/amide cured coaltar epoxy. Total d.f.t. = 400 μm .

Notes:

- Where paints are available in different colours, each coat shall be a different colour.

SYSTEM**B/1**

1 Coat aluminium filled epoxy (twin pack)	d.f.t.	=	125 μm
1 Coat polyurethane enamel (twin pack)	d.f.t.	=	40 μm
Total	d.f.t.	=	165 μm

Application:

- A maintenance coat over weathered coatings on steel.

Notes:

- Surface preparation shall include, as a minimum, removal of all loose mill scale, non-adherent rust and loose paint prior to wire brushing and de-greasing and shall be in accordance with an appropriate internationally accepted standard such as the Steel Structures Painting Council of the USA or that of the Swedish Standards Institute's standards.

SYSTEM**B/2**

1 Coat HB epoxy primer	d.f.t.	=	100 μm
2 Coats polyurethane enamel (twin pack)	d.f.t.	=	60 μm
Total	d.f.t.	=	160 μm

Applied to:

- Motors, gearboxes, cast iron components, steel fabrications, etc.

SYSTEM**C/1**

1 Coat inorganic zinc silicate	d.f.t.	=	75 μm
1 Coat high build modified acrylic coating	d.f.t.	=	75 μm
1 Coat modified acrylic finish to approved colour	d.f.t.	=	30 μm
Total	d.f.t.	=	180 μm

Notes:

- The primer must be factory applied. The intermediate and final coats may be applied on Site.
- Particular care shall be taken to obtain the recommended anchor pattern during abrasive blasting and to achieve the required primer thickness on all surfaces in one coat.
- The primer shall be tested for full cure before applying the subsequent coats.
- This system shall not be used for items subject to immersion.
- Intermediate coat shall be Sigma Topacryl, or equivalent.
- Topcoat shall be Sigma Topacryl Finish, or equivalent.

Applied to:

- Heavy fabricated steel items requiring a primer which travels well and/or can be left for an extended period before overcoating.

SYSTEM	C/2	(“West Coast	Coast	Specification”)
1 Coat inorganic zinc silicate				d.f.t. = 75µm
1 Coat epoxy tie coat				d.f.t. = 75µm
1 Coat polyurethane enamel (twin pack)				d.f.t. = 40µm
				Total d.f.t. = 190 µm

Notes:

- The complete system must be factory applied and touch ups will be required on Site.
- The primer shall be tested for full cure before applying the subsequent coats.
- This system shall not be used for items subject to immersion.
- Applied to:
- Heavy fabricated steel items requiring a hard, high gloss colour finish - eg. bridges, tanks, non-immersed piping, structural steel, etc.

SYSTEM	C/3
1 Coat inorganic zinc silicate	d.f.t. = 75µm
1 Coat modified silicone heat resisting coating suitable for 200 °C	d.f.t. = 75µm
	Total d.f.t = 150 µm

Notes:

- Particular care shall be taken to obtain the recommended anchor pattern during abrasive blasting and to achieve the required primer thickness on all surfaces in one coat.
- The primer must be factory applied.
- The primer shall be tested for full cure before applying the subsequent coat.
- A tie coat suitable for 200 °C shall be included between the primer and topcoat if so recommended by the paint manufacturer.
- The topcoat must cure at ambient temperatures.

Applied to:

- Steel and cast-iron items on dry heat applications with temperatures up to 200 °C continuous.

SYSTEM	C/4
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3 Coats modified silicon	Total d.f.t = 120 µm
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Notes:

- Steel and cast-iron items on dry heat applications with temperatures up to 540 °C continuous.

SYSTEM	D
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1 Coat epoxy primer (twin pack, for HDG surfaces)	d.f.t. = 75 µm
1 Coat polyurethane enamel (twin pack)	d.f.t. = 50 µm
	Total d.f.t. = 125 µm

Applied to:

- Hot-dip galvanized steel pipes, handrails and stanchions, guards, steelwork, etc.

SYSTEM **E/1**

1	Coat wash primer to SABS 723	d.f.t	=	10 μ m
1	Coat zinc chromate primer to SABS 679 Type 1	d.f.t	=	40 μ m
1	Coat universal undercoat to SABS 681	d.f.t	=	35 μ m
2	Coats silicone urethane gloss enamel top coat to colour code	d.f.t	=	<u>70 μm</u>
Total d.f.t =				155 μ m

Notes:

- If the specified dry film thickness of the zinc chromate primer of 40 μ m is not achieved with one coat, an additional coat shall be applied.
- The paints used shall be suitable for internal and external use.
- An alternative priming and undercoat system of superior corrosion resistance may be used.

SYSTEM **E/2**

1	Coat phenolic based primer	d.f.t	=	20 μ m
1	Coat universal undercoat to SABS 681	d.f.t	=	35 μ m
2	Coats machinery enamel	d.f.t	=	<u>50 μm</u>
Total d.f.t =				105 μ m

Notes:

- The paints shall be suitable for internal and external use.
- The paints selected shall not be damaged by oil spillage or grease and shall be reasonably chemical resistant.

SYSTEM **E/3**

1	Coat zinc chromate self-etching wash primer to SABS 723	max. d.f.t	=	10 μ m
1	Coat zinc chromate primer to SABS 679 Type 1	d.f.t	=	40 μ m
1	Coat universal undercoat to SABS 681	d.f.t	=	35 μ m
2	Coats single pack urethane gloss enamel	d.f.t	=	<u>60 μm</u>
Total d.f.t =				145 μ m

Notes:

- All paints shall be suitable for internal and external use.
- If the specified dry film thickness of the zinc chromate primer of 40 μ m is not achieved with one coat, an additional coat shall be applied.

SYSTEM **E/4**

1	Coat water borne vinyl-based primer; Dulux Corrocote 3 or equiv.	d.f.t	=	40 μ m
2	Coats Acrylic Semi-Gloss top coats; Ameron 234 or equivalent	d.f.t	=	<u>100 μm</u>
Total d.f.t =				140 μ m

Applied to:

- General use on hot-dip galvanized surfaces.

SYSTEM **E/5**

1	Coat twin pack epoxy zinc chromate primer	d.f.t	=	30 μ m
2	Coats acrylic semi-gloss coats; Amercoat 234 or equal approved	d.f.t	=	<u>100 μm</u>
Total d.f.t =				130 μ m

SYSTEM**E/6**

1	Coat epoxy strontium chromate primer	d.f.t	=	25μm
2	Coats Dulux Silthane Gloss enamel	d.f.t	=	60μm
		Total	d.f.t	= 85μm

Note:

- The paints used for this system must be suitable for a continuous operating temperature of 120°C or higher.

SYSTEM**F**

1	Coat vinyl copolymer polyester	Total	d.f.t	=	100μm
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Applied to:

- Steel floor grating.

SYSTEM - FUSION BONDED EPOXY

This is a water resistant, non-toxic and non-tainting, fusion bonded epoxy pipe coating in accordance with SABS 1217. The material used shall be of Type 2; i.e., a thermosetting powder-coating material. The finished coating shall have a thickness of 300 µm and no reading shall be less than 200 µm.

Note:

- The Contractor shall execute holiday detection over the full surface in accordance with SABS 1217.
- The items to be coated shall be prepared in accordance with Clause 4.1.1 of the SABS 1217 and shall have edges ground to a radius of curvature of at least 3 mm.
- The surfaces to be coated shall be prepared in accordance with Clause 4.1.2 of SABS 1217 and shall be blasted to a preparation grade of Sa 3.
- Pre-heating is needed to achieve the required coating thickness.

Applied to:

- Immersed objects, cast iron valve bodies, pipework, etc.

SYSTEM – HOT-APPLIED THERMOPLASTIC

This is a synthetic thermoplastic polyamide, Rilsan or equivalent, which shall be applied by dipping the hot object into a fluidised bed of the polymer. The coating shall be executed in accordance with the supplier's recommendations. The finished coating shall have a thickness of 300 µm and no reading shall be less than 200 µm.

Acceptable Materials and Suppliers

The table below lists acceptable materials and suppliers. In all cases, equivalent materials and suppliers are acceptable.

GENERIC	MATERIAL/SUPPLIER
Hot-dip galvanizing	Hot dip galvanisers shall hold the SABS certification mark for SABS 763.
Powder Coating	Plascon epoxy/polyester powder: CEP series, Dulux Sigmalining FBE 27.
Universal Undercoat	Dulux Sigmarine Undercoat, Chemrite Carboline GP-64 Undercoat, Plascon Plasconamel 189 Undercoat.
High-Gloss Alkyd Enamel	Chemrite Carboline AD-51 Finish, Plasconamel 1000 Finish, Dulux Sigmarine BTB Enamel.
HB Epoxy Primer: Twin Pack	Plascon Plascotuff HB Epoxy MLE series, Dulux Sigmacover CM Miocoat, Chemrite Carboline 888.
Epoxy Primer: Twin Pack (for hot-dip galvanized surfaces)	International Interguard 269, Dulux Sigmacover Primer, Carboline 193 Primer.
Polyamine/amide Cured Epoxy sealer/coating:Twin Pack	Chemrite Carboline Rustbond Penetrating Sealer, Plascon Plascoguard Copon EA3 Primer, Dulux Sigmarite Sealer.
Epoxy Tie Coat	Dulux Sigmarite Sealer (used soon after primer application), Dulux Sigmacover CM Miocoat (where there is a delay after primer application), Chemrite Carboline 193, Plascon Plascosafe 18 Primer.
Low solvent, high solids, Polyamine/amide Cured Epoxy: Twin Pack	Plascon Plascoguard Copon KSIR88, Dulux Sigmaguard EHB, Ameron Amercoat 385, Chemrite Carboline 891.

GENERIC	MATERIAL/SUPPLIER
Polyamine/amide Cured Coal Tar Epoxy: Twin Pack	Dulux Sigma TCN 300, Chemrite Carbomastic 200, Ameron Amercoat 78HBB.
Solvent Free Epoxy repair coating	Plascon Plascoguard Copon Hycote 151, Dulux Sigmaguard CSF 75.
Aluminium Filled Epoxy: Twin Pack	Ameron Amerlock 400 AL, Carbomastic 15, Sigmacover Aluprimer.
Zinc Phosphate Primer	Chemrite Carboline GP-18 Primer, Plascon Plascoprime 183 HB, Dulux Bildphos M10 Primer.
Inorganic Zinc Silicate	Plascon Plascozinc 233, Dulux Sigma Tornusil MC60, Chemrite Carbozinc 11, Ameron Dimetecote 11.
Modified Silicon	Chemrite Carboline 4631, Plascon Plascotherm Silicone 540 – Aluminium, Dulux Sigmatherm Silicate.
Silicone Acrylic	Plascon Plascotherm Silicon – Acrylic 200 T, Chemrite Carboline 1248.
Polyurethane Enamel: Twin Pack	Dulux Sigmadur Gloss, Chemrite Carboline 134 over polyamine/mide coatings, Chemrite Carboline 133 HB over zinc coatings, International Interthane 990, Plascon Plascothane Recoatable Enamel CPC Series, for two-coat systems, Plascon Plascothane Recoatable Enamel CPQ Series, for single coat systems.

PSB1.14 FASTENERS

PSB1.14.1 Standards

Bolts and nuts shall be hexagon head type complying with SABS 135 with threads of the coarse pitch series. Allen head screws of any type shall not be used without the Engineer's written consent.

PSB1.14.2 Fasteners M12 and Smaller

All fasteners M12 and smaller shall be manufactured of grade 316 stainless steel.

PSB1.14.3 Fasteners Larger than M12 - in Corrosive Areas

All fasteners in corrosive areas shall be manufactured of 316 SS. Corrosive areas shall be taken to include any moist or wet area such as in and above settling tanks, in or in the vicinity of open channels, where a continuous spray can be expected and all internal and external areas in the vicinity of the inlet works of a wastewater treatment works. All fasteners embedded in brick, concrete or soil shall also be of 316 SS.

PSB1.14.4 Fasteners Larger than M12 - Non-Corrosive Areas

Fasteners larger than M12 which are in non-corrosive areas shall, except when specified otherwise, be hot-dip galvanized.

PSB1.14.5 High Tensile Bolts

Where high tensile bolts are required by the design, they shall be hot-dip galvanized and painted. The bolt holes and crevices shall be filled and sealed prior to painting.

PSB1.14.6 Material Compatibility

Fastener material shall always be of equal or better corrosion resistance than the items being fastened, e.g., 316 stainless steel bolts must be used to fasten together 316 stainless steel fabrications or flanges.

PSB1.14.7 Washers

Washers of similar material to the bolts shall be provided under each nut and setscrew head. Multiple washers or shims shall not be used. Spring washers or other approved locking arrangement shall be used on all fasteners subject to vibration.

PSB1.14.8 Anti-Seize Compound

Before assembly, threads shall be treated with a nickel based, anti-seize/corrosion protection compound; Chesterton 725: Nickel Anti-Seize Compound, or equivalent. The thread shall be treated in the area under the final position of the nut. Compound on the exposed thread shall be cleaned off after installation. If it is found during inspection that compound has not been applied, the Contractor shall disassemble all fasteners and comply with this requirement.

PSB1.14.9 Thread Projection

Bolt threads shall project between 1 and 6 mm from the head of the nuts when fixed. Longer projections will only be allowed if the Contractor can show that bolts of a more suitable length are not manufactured.

PSB1.14.10 Corrosion Protection

After installation the exposed surfaces of bolts not made of 316 stainless steel shall be coated as for the items being fastened. If the use of Allen head or similar fasteners has been approved by the Engineer, the recessed heads shall be filled with a suitable non-hardening sealing compound.

PSB1.15 ANCHOR FASTENERS**PSB1.15.1 Type and Material**

All anchor fasteners shall be of grade 316 stainless steel.

Anchor fasteners for water retaining structures and for brickwork shall be of the chemical anchor fastening type. Anchor fasteners for other applications may be of the expanding type or chemical anchor type.

PSB1.15.2 Hook Bolts

Grade 316 stainless steel hook bolts shall be supplied and grouted by the Contractor into pockets which will be provided in the concrete structure in accordance with the information to be supplied by the Contractor. The grouting products shall be used strictly in accordance with the manufacturer's instructions.

PSB1.15.3 Alternative Anchor Bolts

The use of 316 stainless steel "Hilti Kwik Bolt" stud bolts or similar may be used as an alternative where approved by the Engineer. If steel reinforcing bars are encountered while the holes are being drilled, the Contractor shall knock a hole in the concrete around the steel and grout in a stainless-steel hook bolt as described above.

PSB1.15.4 Through-Bolt Anchors

Where machinery is anchored by studs or bolts which extend through the supporting structure and is therefore fastened down with the use of nuts from both sides, these, together with associated washers and brackets, shall also be of grade 316 stainless steel.

PSB1.15.5 Anti-Seize Compound

All threads shall be coated with an approved nickel-based, anti-seize/corrosion protection compound before assembly.

PSB1.16 GRID FLOORING

All grid flooring shall be Mentis type RS40 or equal approved with bearer bars across the shorter span. The depth of bearer bars shall not be less than 30 mm with a bearer bar pitch of not greater than 40 mm. Panels are to be set level and fixed down in angle frames so as to prevent rocking. All cut-outs in grid flooring for pipes, valve spindles and the like are to be banded and made before any corrosion protection is done. The edges of removable grid access covers must also be banded.

Grid flooring and frames shall be hot-dip galvanized after fabrication. Painting is not required unless called for in the Detailed Specification.

Where grid flooring bears onto painted surfaces, strips of rubber insertion material shall be secured under the grid flooring to protect the paint.

The fixing clip set (saddle clamp and locking plate) shall be of hot-dip galvanised steel but all fasteners shall be of grade 316 stainless steel.

PSB1.17 GUARD RAILING

Guard railing shall be provided in accordance with legislated requirements and shall be provided generally in positions where the vertical change in level is 1 000 mm or greater.

PSB1.17.1 Guard Railing for Equipment Installations

Guard railing shall comply with SABS 0104.

The following specific requirements shall be complied with:

- a) All guard railing shall be hot dipped galvanizing and shall comprise hand and knee rails not less than 32 mm diameter and stanchions spaced at not more than 1,8 m except where specifically directed otherwise in writing by the Engineer.
- b) On platforms, walkways, landings, or around dangerous areas the vertical height, measured from the top of the handrail to the floor or surface, shall be at least 1 000 mm.
- c) On stairways and fixed ladders, the rails shall be parallel to the strings, and the vertical height, measured from the top of the handrail to the nosing of the tread, shall be at least 900 mm.
- d) For applications covered by this Specification, the rails and stanchion shall withstand, without permanent deflection, a proof force of 890 N and 1780 N respectively, applied at any point and in any direction. Contractors shall provide proof that their guard railing has been tested and withstands these loads.
- e) Stanchions and rails shall be smoothly finished and free from sharp corners, edges and projections which may injure persons or damage clothing. Stanchion bases shall have the corners rounded or sheared off.
- f) Railing, if tubular, shall be joined using the slip-jointing method with separate and neatly fitting tubular inserts fitted into the railing bore. If used, pins shall have their ends peened over and smoothed or, if taper pins are used, shall be filed off flush with the rail. The joint shall withstand the loads specified above when situated in any position including centrally between two stanchions. Joints shall preferably be located inside the stanchion balls. All joints shall be sealed.
- g) Railings shall be ended off with positively fixed (pinned) closure bends. At corners, short radius bends with stanchions on both ends shall be employed or, alternatively, stanchions specifically designed for such a position shall be employed. No sharp endings will be permitted.
- h) Stanchions shall generally be base-mounted to suit the arrangement requirements and shall be of solid or welded construction. Welding shall be compatible with the material, shall not impair the strength or corrosion resistance of the material, shall be continuous and shall be smoothly finished and then passivated.
- i) Stanchions shall be self-draining to suit the mounting arrangement.
- j) Holes for the rails to go through the stanchions shall have a diametral clearance not exceeding 1 mm but preferably 0,5 mm. On stairways with stanchions vertically mounted, the hole shall be angled to suit and shall accurately fit the angled rail with the abovementioned clearances. The crevices caused by rails passing through the stanchions shall be sealed.
- k) Stanchion feet which are attached to metallic surfaces shall have minimum dimensions of 150 mm X 60 mm. Two fasteners of minimum size M16, shall be used to attach the foot. Foot material thickness shall be not less than 8 mm. Neatly fitting packing, Denso tape or equivalent, shall be fitted under stanchion feet to prevent the formation of crevices.
- l) Stanchion feet which are attached to non-metallic surfaces shall have minimum dimensions of 150 mm X 150 mm. In instances where the horizontal surface to which the foot is to be fastened is less than 150 mm wide, the foot shall be designed to be seated on at least two surfaces. Four fasteners of minimum size M16, shall be used to attach the foot to the concrete. Foot material thickness shall be not less than 10 mm.

- Non-shrink, cementitious grout shall be applied under the foot just prior to final tightening of nuts.
- m) Stanchion feet shall be epoxy-coated.
 - n) A nickel-based, anti-seize compound shall be applied to all threads before fastening.
 - o) All components shall be supplied in the pickled and passivated condition which may also be polished. All surfaces must be uncontaminated and unmarked to ensure maximum corrosion resistance. A manufacturer's test certificate shall be provided for each batch of stainless steel giving the chemical analysis of the material.
 - p) Inserts for internal slip joints may be of non-corrosive material using steel reinforcing provided the steel is completely enclosed.
 - q) Where kickplates are required by legislation, these shall extend to 150 mm above the walkway level.

PSB1.17.2 Guard Railing in Public Places

The requirements for guard railing at equipment installations shall also apply for guard railing for public places. The following specific requirements must also be complied with:

- a) The structural design shall be done in accordance with the requirements of SABS 0104.
- b) No opening in guard railing installed in public places shall allow the passage of a ball of 100 mm diameter.

PSB1.18 PERMANENT LADDERS AND STAIRS

PSB1.18.1 General

Permanent ladders shall comply, primarily, with the requirements of the Occupational Safety and Health Act and, secondarily, with BS 5395. Stairs shall comply with BS 5395, Part 3.

Unless other materials are specified, ladders and stairs shall be of carbon steel and hot-dip galvanized after all fabrication has been completed.

PSB1.18.2 Permanent Ladders

Ladders shall comply with the following detail design aspects:

- (a) Access points to the head of ladders from platforms and walkways shall be protected by self-closing gates or by chains.
- (b) No part of the ladders shall project into the passageway.
- (c) The width between strings shall be between 380 mm and 450 mm.
- (d) A minimum clear space of 230 mm must be allowed behind the rungs.
- (e) The diameter of the rungs shall be between 20 mm and 50 mm.
- (f) Additional rungs shall be provided in the same horizontal plane as the top rung in order to close the gap between the platform and the ladder. Sufficient rungs shall be provided to ensure a maximum gap of 75 mm. These top rungs shall be at the same level as the floor or platform to which access is being provided.

- (g) Strings shall be formed from flat bar.
- (h) The vertical distance between the ladder support brackets shall not exceed 1 800 mm.
- (i) The strings shall extend to 1 100 mm above the floor or platform and shall be matched with any guard rail protections at this level. Connections between hot-dip galvanized steel ladders and hand guard railing shall be bolted. Unless laterally supported by the guard rails, these strings shall be supported by vertical structural sections (not flat bar) whose footings shall comply with this Specification for guard rail stanchion feet.
- (j) All rises in a flight shall be uniform and the surface of the top rung shall be level with the top platform or landing. The height chosen for the rise shall be between 225 mm and 255 mm.
- (k) Except on chimneys, the height of a ladder should not exceed 6 000 mm. Greater heights shall be provided with intermediate landings between each 6 000 mm ladder section.
- (l) If the height between start and end levels is over 4 000 mm, the ladder shall be fitted with a safety cage. The safety cage shall extend at least 1 000 mm above the higher landing. The cage shall be no more than 700 mm away from the plane of the rungs. The cage shall comprise at least seven vertical elements.
- (m) Anchor bolts shall be of grade 316 stainless steel and shall be no smaller than M16.
- (n) Strings, rungs and anchor brackets shall be of solid structural sections (e.g., flat bar, round bar, square bar, angles, etc.) and no hollow sections will be accepted for any part of the ladder.

PSB1.18.3 Stairs

Stairs shall comply with BS 5395.

PSB1.19 PIPEWORK

PSB1.19.1 Pipes and Fittings

- a) **STEEL PIPE - GENERAL DUTIES:** Steel pipes for general non-corrosive, non-abrasive duties for liquid, air and gas shall be as follows:

- Up to DN 150 - SABS 62 medium class
- Over DN 150 - SABS 719

Unless otherwise specified, steel pipework and fittings shall be hot-dip galvanised and painted.

- b) **STEEL PIPEWORK – DESIGN:** Pipework up to DN 600 shall be in accordance with SABS 1476. Pipework for the conveyance of water shall, in addition, comply with CCT-WS 11 Standard Specification for Steel Pipe, Fittings and Specials.
- c) **STAINLESS STEEL PIPEWORK:** Stainless steel pipework shall be to ASTM 312. Schedule 10 pipes and fittings shall be used except where otherwise specified.
- d) **STEAM PIPEWORK:** Steam pipework smaller than DN 50 shall be of 316 stainless steel to ASTM A-312 Schedule 40 or approved equal. Steam pipework DN 50 and larger shall be manufactured to SABS 62 heavy class, ANSI B36.10 STD/Schedule 40 or to BS 1600 Schedule 40. Steel pipework shall be supplied with a suitable temporary corrosion protection both internally and externally in order to prevent corrosion during

the storage, installation and pre-commissioning period. A primer like Plascon SNK 2, phenolic modified polyvinyl butyral self-etch primer, would be suitable.

- e) **HYDRAULIC & OIL PIPEWORK:** Hydraulic pipework shall be to BS 778 or equal. All hydraulic and oil pipes and fittings shall be thoroughly degreased, descaled and cleaned internally and externally after fabrication by abrasive blasting or pickling, thoroughly cleaned and rinsed, dipped in a hot iron phosphate solution, and coated internally with a corrosion inhibiting, oil soluble preservative. After treatment and drying all openings shall be sealed until the pipes are installed.
- f) **BUTT WELD FITTINGS:** Steel butt welding pipe fittings shall be to ANSI B 16.9, BS 1965 or BS 1640 of the same schedule as the pipework or heavier. Butt weld fittings in stainless steel shall be to ASA B 36.19 for schedule 5S and 10S and ASA B 16.9 for schedule 40S and 80S. Alternatively, fittings may be to BS 1640.
- g) **MALLEABLE CAST IRON:** Malleable cast iron fittings shall be to SABS 509.
- h) **CAST IRON:** Cast iron pipes and fittings shall comply with BS 2035 (Class D) and shall be pressure tested in accordance with Clause 12 of that Standard. The requirements of the Standard's Clause 6 regarding freedom from defects and casting appearance and Clauses 8, 9 and 10 regarding casting accuracy will be strictly applied. The requirements of the Standard with regard to protection and flanges shall be modified to comply with this Specification. Also refer to Clause "Castings" of this Specification.
- i) **COPPER PIPES:** Copper pipes shall be to BS 2871 or approved equal.
- j) **PLASTIC PIPEWORK:** Polyethylene or Polypropylene pipes shall comply with SABS 533 and SABS 1315 respectively and shall carry the SABS mark. The contractor manufacturing and installing the pipework shall satisfy the requirements of SABS ISO 9002. PVC pipework is not acceptable except where specified.

An operating life of 50 years shall be designed for and appropriate derating factors shall be applied to suit the application. The rated maximum working pressure at operating conditions of the class of pipe selected shall be not less than 1,5 times the actual maximum operating pressure. If the material used has insufficient resistance to solar radiation (U.V. light) for the application, suitable protection must be provided to achieve the required life.

Note that nominal bores and pipe diameters specified must be regarded as the minimum inside diameter.

PSB1.19.2

Pipework Design

- a) **PIPE TYPE AND MATERIAL:** The type and material of pipe to be used will be given in the Detailed Specification.
- b) **PIPE DIAMETERS:** Unless otherwise specified in the Detailed Specification, pipe diameters shall be based on the following velocities. The velocities shall be based on the compressed volume at the operating pressure in the case of steam, air and other gases. Valves and other ancillaries shall generally be of the same nominal diameter as the pipe. Non-standard sizes shall not be used.

FLUID	FLUID FLOW [ℓ/s]			
	0-2,5	2,5-15	15-100	100-500
	ALLOWANCE FLOW VELOCITY [m/s]			
<u>LIQUID</u>				
GRIT FREE:	0.75 max	1,25 max	1,5 max	2 max
HIGH SOLIDS OR GRIT:		0,8 min	1 min	1 min
		1,5 max	1,75 max	2 max
<u>STEAM</u>	10 max	15 max	20 max	25 max
<u>AIR AND GAS</u>				
above 10 kPa	5 max	8 max	10 max	12 max
below 10 kPa	2,5 max	3 max	4 max	5 max

- * Grit free liquids include potable water, final effluent, centrate, supernatant, etc. Liquids considered having high solids content will include raw sewage, sludge and grit slurry.

If anomalies occur within the same system using the above table, the larger pipe diameter shall generally be used.

- c) **COUPLING ARRANGEMENT:** Screwed fittings may be used on DN 50 and smaller provided that sufficient unions or flanges are provided for disassembly and removal of equipment. Reducing sockets and not reducing bushes shall be used where required.

All steel pipes larger than DN 50 shall be flanged or fitted with pipe couplings as applicable.

Suitable flexible couplings shall be incorporated wherever necessary to facilitate maintenance or isolate vibration. A flexible pipe coupling shall be provided on each pump suction. Flexible couplings shall be adequately restrained by harnesses as specified in the Clause "Flexible Pipe Couplings".

- d) **DRAINING, VENTING AND PURGING:** On liquid lines provision shall be made for draining and venting where necessary. Vents shall be provided at all vertical down bends on gravity lines. On gas lines provision shall be made for purging.

- e) **CONDENSATE DRAINS:** Automatic condensate traps with isolating valves and valved by-passes shall be provided at all necessary points including ahead of any globe type valve, orifice plate or concentric reducer in a horizontal line, at each change of level and immediately ahead of the user equipment.

A suitable well of a diameter equal to the pipe diameter with a bottom drain shall be provided at each condensate removal point. Condensate traps and valves shall be accessible, and condensate shall be piped to the nearest drain. Pipework shall be sloped in the direction of flow towards a drain point with a slope of 1 in 150 and care

shall be taken to avoid sagging at any point.

- f) **BY-PASSES:** Isolating valves and valved by-passes shall be provided around condensate traps, pressure reducing valves and valves with solenoid or other actuation which do not have provision for manual operation.
- g) **ENCASED PIPES:** Pipework to be permanently encased in concrete, cement or similar shall be of cast iron or 316 stainless steel for steel and stainless-steel pipework respectively. The encased portion must be a separate section flanged both ends with adequate clearance between the wall surface and the flanges. Victaulic type couplings may in some instances be permitted instead of flanges.

Pipe sections through walls below ground or water level shall be provided with a puddle flange the same diameter as a standard flange. The encased area shall in such cases be uncoated up to 30 mm inside the wall surface and coated to Specification from there on.

- h) **ISOLATION:** The layout design shall make provision for isolation and easy removal of mechanical equipment.
- i) **NOZZLES FOR FITTINGS GAUGES, ETC.:** Nozzles on pipework (for installation of gauges, transmitters, drainpipes, cooling water take-offs, air valves, etc.) shall be designed so that the pipework corrosion prevention system is not affected.

Nozzles shall consist of a flanged, welded tee-off of at least 100 mm in diameter, painted internally and provided with a non-corrosive blank flange, e.g. grade 316 stainless steel. The blank flange shall be provided with tapped holes suitable for the equipment installation.

A nozzle on cement-lined, carbon steel pipework shall consist of a flanged, cement lined tee-off (of at least 100 mm diameter) and a non-corrosive blank flange.

Internally painted, small diameter carbon steel nozzles and screwed carbon steel tee-offs are both unacceptable as nozzles. Carbon steel pipework may be provided with small diameter, grade 316 stainless steel nozzles which are welded into the pipework if the Engineer considers this acceptable in the application.

PSB1.19.3 Pipework Installation

- a) **APPEARANCE:** Pipes and fittings shall be conservatively selected to suit the application, neatly installed, straight to line and level, adequately supported and shall operate without vibration.
- b) **VALVE ORIENTATION:** On sludge or raw sewage pipelines, check valves shall, wherever possible, be mounted horizontally and isolating valves with spindles vertical. Valve handwheels shall be arranged so that they are accessible to the operators.
- c) **SUPPORTS:** No external loads shall be placed on items of mechanical equipment such as pumps, compressors, etc. Adequate provision shall be made for expansion and contraction due to variations in temperature or pressure.

A drawing or sample of proposed pipe supports shall be submitted to the Engineer for approval prior to manufacture.

Pipe supports shall be so located that when an item of mechanical equipment is removed, the associated valves and pipework are still adequately supported. Supports shall be provided close to heavy items such as valves.

3 mm thick neoprene strips shall be placed between pipes and supports or clamps to protect the paintwork and limit corrosion. Where roller or sliding supports are used to accommodate movement, suitable wear blocks shall be fixed to the pipe to prevent damage.

Where the Engineer approves the use of concrete pipe supports to be built by a civil contractor under a separate contract, these shall be constructed after installation of the pipework and temporary supports shall be provided by the Contractor in positions which will not interfere with the construction of the concrete supports.

- d) **PRESSURE TESTIN:** All pipelines shall be pressure tested to 1,5 times maximum working pressure. This shall be done before covering up the pipeline in any way where applicable and shall be witnessed by the Engineer.

PSB1.20

FLANGES

1. **STANDARDS:** All standard flanges shall comply with SABS 1123. For flange sizes not included in the SABS, BS 4504 shall be used. Cast iron flanges and their mating flanges shall have flat faces. The flange table shall be as specified or, if not specified, selected to suit the maximum possible operating pressure but not less than Table 1000. Drilling and installation of flanges shall be "off-centre".
2. **FLANGE FIXING:** Flanges DN 50 and smaller may be of the screwed-on type. Metal flanges above DN 50 shall be welded on in accordance with BS 806 Type 6 unless otherwise agreed or specified.
3. **MACHINING OF FLANGES:** All flanges shall be machined on the sealing face. Flanges cut from plate shall also be machined on the bore and outside diameter. Cast iron flanges shall also be machined or spot faced on the back of the flange to ensure a flat bearing surface for the fastener's head or nut and washer. All edges, including bolt-holes, shall be chamfered or rounded to a 2 mm radius.
4. **BUTT FLANGES:** If the use of a loose hot-dip galvanized butt flange arrangement with stainless steel pipework is specified or approved by the Engineer, such arrangement and design shall comply with BS 4504 Table 6/6 or 10/6 as appropriate. The butt-welded shouldered end for the pipe may be rolled from hot rolled stainless steel angle section. The hot-dip galvanized butt flange must be electrically insulated from the stainless-steel pipework.
5. **RECTANGULAR FLANGES:** The use of square or rectangular flanges shall be avoided and will not be accepted for pressures above 100 kPa. The thickness of flanges designed for positive or negative pressures between 20 and 100 kPa shall be not less than 75 % that of a circular flange of equivalent nominal opening area manufactured to Table 600 of SABS 1123. For pressures 20 kPa and below the flange thickness shall be to the Engineer's approval. Bolting shall in all cases be to the Engineer's approval.

6. **GASKETS:** The jointing material used on flange joints shall be of rubber or compressed asbestos fibre at least 3 mm thick complying respectively with BS 2494 or BS 1832, as applicable. Full face gaskets shall be used for full face flanges. Inner bolt circle gaskets shall be used on raised face flanges and when clamping items such as wafer type valves between flanges inside the bolt circle. Properly designed O-ring seals are also acceptable.

PSB1.21 FLEXIBLE PIPE COUPLINGS

PSB1.21.1 Coupling Types

Where movement or misalignment must be allowed for, or if necessary for any other reason, rubber expansion joints may be used if approved by the Engineer. The flexible material used for rubber expansion joints shall be chosen specifically for maximum resistance to bursting.

Viking Johnson couplings and flange adaptors, or equivalent, may also be used if approved by the Engineer and these shall be supplied without centre register unless otherwise specified.

Flexible couplings for cast iron pipes and, where specified, for asbestos cement pipes, shall be of the cast iron short or long collar type. Flexible couplings for steel or stainless-steel pipework may be of the "Victaulic" type or approved equal for grooved or shouldered end pipes.

Couplings for plastic pipes shall be of the clamp type employing buttressed pipe ends.

PSB1.21.2 Pipe Ends

Pipe ends shall be prepared strictly in accordance with the coupling manufacturer's recommendations. Where machining is required, as in the case of cast iron pipes, the length of machining on each pipe shall be approximately equal to the total length of the coupling to ensure that the coupling can be separated for pipe removal.

PSB1.21.3 Supports and Anchors

Pipework using flexible couplings shall be supported and anchored strictly in accordance with the coupling manufacturer's recommendations. Harnesses against separating forces shall be provided where appropriate to the approval of the Engineer. Where this restraint is not provided by the layout, other neat and positive means of harnessing shall be provided. A system incorporating additional flanges or lugs cast on in the case of cast iron, or welded on for steel, and connected by tie bars or positively fixed to anchors, will be accepted. Systems relying purely on friction will not be acceptable.

PSB1.21.4 Corrosion Protection

Cast iron couplings shall be painted. Steel couplings for gas applications shall be hot-dip galvanized. Steel couplings for fluid applications shall be coated in accordance with System – Hot Applied Thermoplastic or System - Fusion Bonded Epoxy.

Metal backing flanges for rubber expansion joints shall be of stainless steel or hot-dip

galvanized

steel.

PSB1.21.5 Fasteners

Fasteners for Viking-Johnson type couplings shall be of grade 316 stainless steel. This includes coupling studs, stub studs (i.e., studs welded to the flanges of flange adaptors), washers and nuts.

Fasteners for other couplings shall be of stainless steel or hot-dip galvanized steel.

PSB1.21.6 Underground Protection

When couplings are part of a buried pipeline the couplings shall be enclosed with "Denso mastic" to a smooth finish, wrapped with "Denso tape" and then wrapped with a polythene sheet which is strapped in place. If the operating temperature is likely to exceed 70°C the Denso paste, and tape shall be replaced with a suitable grease or a suitable sealer.

PSB1.22 CONDENSATE TRAPS FOR SEWAGE GAS

Not

used

PSB1.23 FLAME ARRESTERS

Not

used

PSB1.24 PRESSURE RELIEF AND VACUUM BREAKER VALVE WITH FLAME ARRESTER UNIT

Not

used

PSB1.25 VALVES FOR LIQUIDS OR GASES**PSB1.25.1 General**

The valves to be used on the more common applications are specified below. Where special valves are necessary for special applications, these may be specified in the Detailed Specification but, if not, the Tenderer must select suitable valves and provide details with his tender.

PSB1.25.2 Requirements for All Valves

- a) **CONSTRUCTION AND DESIGN:** Valves shall be designed and constructed to ensure reliable operation after long periods of non-operation.

Valves shall be double-flanged unless unavailable or otherwise specified.

Valves and their method of actuation shall be designed to provide operation under the full pressure rating of the valve.

- b) **OPERATING DIRECTION:** The handwheel, lever, etc. on valves, valve actuators and valve gearboxes to be supplied and installed for the Water Department of the Water and Waste Directorate of the Municipality shall be configured to be anti-clockwise closing unless unobtainable.

All valves supplied and installed shall be clockwise closing.

- c) **POSITION INDICATION:** All valves, including valves with gearboxes and valves with actuators, shall be provided with indication of current position as well as indication of closing and/or opening direction. Valves with configurations which makes this information apparent will be acceptable.
- d) **CORROSION PROTECTION:** The specific application shall be considered in the corrosion protection of valves.

Cast iron valve components, including valve bodies, shall be protected with System - Fusion Bonded Epoxy.

- e) **FASTENERS:** Valve and valve gearbox fasteners shall be of grade 316 stainless steel.

PSB1.25.3 Cast Iron Gate Valves with Resilient Seals

- (a) Resilient seal gate valves may be used on raw sewage, raw water, effluent and general duties where some solids may be present but must not be used on high solid applications such as sludge and grit duties.
- (b) The valves shall comply with SABS 664 or SABS 665, Class 10 or higher as required.
- (c) The valves shall be double flanged.
- (d) Valves shall have rising spindles unless otherwise specified or necessary because of space restrictions. Non-rising spindle valves shall be fitted with indicators showing the valve opening position.
- (e) Handwheels shall be of cast-iron.
- (f) Fixing lugs for end of travel limit switches shall be provided
- (g) Handwheel size and construction shall permit easy opening of the gate when subjected to a differential pressure equal to the maximum operating pressure anticipated. Suitable gearboxes shall be fitted to provide easy opening when necessary. These gearboxes shall be grease filled.
- (h) Valves larger than DN 150 shall be provided with bypass arrangements.

PSB1.25.4 Cast Iron Gate Valves (Wedge Gate)

Wedge gate valves shall be used on raw water and treated water duties but shall not be used on raw sewage, raw water, effluent, sludge and general duties where some solids may be present. The valves shall comply with the following:

- (a) The valves shall comply with SABS 664 or SABS 665, Class 10 or higher as required.
- (b) The valves shall be double flanged.
- (c) The material of the body seat and the material of the gate trim shall be of copper alloy or stainless steel.
- (d) The body shall be provided with channel guides and the gate shall be provided with shoes. Guides and shoes shall be of copper alloy or stainless steel and shall guide the gate along the complete travel distance.

- (e) Fixing lugs for end of travel limit switches shall be provided.
- (f) Valves shall have rising spindles unless otherwise specified or necessary because of space restrictions. Non-rising spindle valves shall be fitted with indicators showing the valve opening position.
- (g) Handwheels shall be of cast-iron. Handwheel size and construction shall permit easy opening of the gate when subjected to a differential pressure equal to the maximum operating pressure anticipated. Suitable gearboxes shall be fitted to provide easy opening when necessary. These gearboxes shall be grease filled.
- (h) Valves larger than DN 150 shall be provided with bypass arrangements.
- (i) Valves larger than DN 250 shall be provided with doors for inspection and cleaning.

The valves shall comply with the additional requirements of CMC-WS15:1993 where applicable.

PSB1.25.5 Knife-Gate Valves

- (a) Knife-gate valves must be used on water sludges as well as on primary, waste activated and digested sludge duties. They shall also be used on other high solids application and may be used for duties specified under Clause "Cast Iron Gate Valves with Resilient Seals".
- (b) Valves shall be Insamcor HDH CI STD, or equivalent, with cast iron bodies, stainless steel blades, cast handwheels, and no carbon steel parts.
- (c) Valves for water sludges shall be anti-clockwise closing. Valves for primary, waste activated, and digested sludges shall be clockwise closing.
- (d) Valves shall have chamfered blade edges and resilient body seals and may have either rising or non-rising spindles. Gate position indication shall be provided if the overall design does not make this apparent. The blade shall be loaded through its central plane during opening and closing and this shall be achieved by using a clevis link or similar. Blade scrapers shall be incorporated to protect the body seal and valve chest. As the valve is opened, the scrapers shall clean the blade surfaces before these contact the body seal. The scrapers shall be of a non-elastomeric, non-metallic material and shall be designed to cause minimal damage to the blade.
- (e) Valves shall be droptight in either flow direction. Suitable sealing shall be provided to prevent leakage from the valve and it shall be possible to adjust these seals while the valve is in line under pressure.
- (f) Internal and external surfaces of the valve body shall be protected with a water resistant, non-toxic and non-tainting, fusion bonded epoxy pipe coating in accordance with System - Fusion Bonded Epoxy.
- (g) Valves shall be double-flanged and shall suit the standard flange rating but may incorporate drilled and tapped fastener holes (the type of valve which is clamped between two flanges will be considered for acceptance only in positions where it is very likely that the pipe or flanged item on either side will never have to be removed or if isolation will not be necessary if it is removed). Fasteners may be studs or setscrews manufactured to suit the tapping depth.

PSB1.25.6 Waterworks Type Butterfly Valve

- (a) **For use on raw and potable water duties.**
- (b) **These** shall comply with SANS 1849

PSB1.25.7 Resilient Seal Butterfly Valves

- (a) For use on air, gas and clean liquid duties.
- (b) Butterfly valves shall be of the resilient seal type with suitably lined cast iron body and a lined or 316 stainless steel blade.
- (c) Shafts and fittings shall be of stainless steel and bearing bushes of Teflon or similar. Seals shall be selected to suit the application. No carbon steel components shall be permitted internally and externally such components shall be properly protected.
- (d) Valves shall be air, gas and watertight when closed.
- (e) Hand lever valve actuation with a locking system for incremental valve setting from fully shut to fully open shall be provided for valves up to and including DN 200. Valves larger than DN 200 shall be equipped with robust, weatherproof grease-filled gearboxes with an indicator to show the degree of valve opening.
- (f) For normal usage, the valves may be of the type which is clamped between two flanges. Where it is necessary to remove equipment on either side for maintenance purposes, suitable spacer pipes must be provided or the valves shall be flanged and provided with drilled and tapped holes.
- (g) The valves shall be installed with horizontal disc shafts.

PSB1.25.8 Bronze Isolating Valves

- (a) **May be used for isolating duties on clean air and liquid duties up to DN 50.**
- (b) Bronze gate valves shall be to SABS 776. Ball or plug valves of appropriate construction may also be used where preferred.

PSB1.25.9 Rubber Diaphragm Valves

- (a) To be used on sewage, sludge and other dirty or corrosive liquid duties requiring valves up to DN 80. May also be used on clean liquid duties.
- (b) Rubber diaphragm valves shall preferably be of the straight through type.
- (c) This type of valve shall not be used on the suction side of pumps or on any line subject to vacuum.

PSB1.25.10 Needle Valves (above DN 150)

Needle valves, VAG Plunger Valve or equivalent, shall be used for the regulation of flow and/or pressure in pipelines containing water where the size is DN 150 or greater unless this is overridden by the requirements of the Detailed Specification. The configuration shall be double-flanged with co-axial flanges unless otherwise specified.

The seal seat and associated downstream parts shall be selected to prevent any cavitation for the application. Such parts shall be of stainless steel or copper-based alloy.

PSB1.25.11 Telescopic Overflow Valves

Telescopic overflow valves, (Fulton, or equivalent), shall be vertically mounted and shall be specifically designed for the purpose intended.

Operation shall be by handwheel mounted on an independently mounted headstock. Rising spindles are preferred. The outer tube shall be flanged and bolted to a similarly

flanged vertical pipe. The inner tube shall incorporate a conical bellmouth. The bridge connecting the inner tube to the valve's spindle shall be attached to the outside of the bellmouth in order to limit the effect of fouling rags, etc. The spindle shall be of grade 316 stainless steel or better. The outer tube and inner tube shall be of 3CR12. The headstock and handwheel shall be of painted cast iron or painted 3CR12.

PSB1.26 CHECK VALVES

PSB1.26.1 General

A shut-off valve shall be installed downstream of each check valve.

The check valve installation shall ensure that flaps are able to open fully without being impeded by, for example, a shut-off valve, bend or pipework internal lining. Where a check valve is located close to another valve, an intervening spool piece with a minimum flange-to-flange length of 1,5 times the valve diameter shall be provided.

Bronze swing type check valves may be used for pipework up to DN 50.

PSB1.26.2 Check Valves for Water

Check valves for treated water and raw water duty shall be of the double-flap, positive-closing type (Stockham Duo-Chek II, or equivalent).

Bodies shall be of cast-iron or cast-steel. Flaps shall be of the light, leaf type, shall be of bronze or stainless steel with machined sealing faces, shall be specifically designed to be non-sticking, and shall have teflon bearing washers. Seals shall be of resilient material. The axis of rotation of the flaps shall be vertical, pins shall be of 316 stainless steel and closure shall be initiated by stainless steel springs, suitably rated for the duty so that closing is initiated prior to the onset of reverse flow.

Positive, external indication of the position of both plates shall be provided.

PSB1.26.3 Swing Check Valves

Swing check valves shall be used on all sewage, sludge or similar applications.

Swing check valves shall be flanged, shall be of all iron construction suitable for a working pressure of at least 1 000 KPa, and shall be fitted with a side lever and adjustable weight.

Orientation of the valve installation shall comply with the manufacturer's recommendation.

PSB1.27 AIR VALVES

PSB1.27.1 General

Air valves for water shall be of the non-slamming type, Vent-O-Mat or equivalent.

Air valves for sewage and similar duties shall be specifically designed for the application.

PSB1.27.2 Arrangement and Installation

Air valves shall be installed above pockets designed to collect air. The pockets shall be designed in accordance with the requirements for nozzles in the Clause "Pipework". The diameter of the nozzle shall be at least half the diameter of the parent pipework.

Air valves shall preferably be flanged and shall be provided with isolating cocks.

PSB1.28 PENSTOCKS**PSB1.28.1 General**

Penstocks shall be of the rising stem configuration if feasible. If this is not feasible, non-rising stems are acceptable.

PSB1.28.2 Design

Penstocks shall be designed to be operated under full design pressure for both manual and power actuated operation. The headstock beam shall be designed to accommodate the door opening and closing forces with no visible deflection.

A system of adjustment shall be provided for ensuring that the penstock door is held against the seal correctly. Side wedge door adjusters shall be provided. Top and bottom wedge door adjusters shall be provided where required by the installation.

The door shall slide between polymer, elastomer or non-ferrous alloy materials. Direct contact between the door and the frame is not acceptable.

Wedges, guides, seals, door nuts and drive sleeves shall be replaceable.

Stem guides shall be provided along the length of the stem. The spacing between them shall not exceed the height of the door.

Power actuated penstocks shall also be provided with manual operation by handwheel.

PSB1.28.3 Materials

The penstock door and frame shall be of cast iron or grade 316 stainless steel.

The door guides, seals, door nut and drive sleeve shall be of polymer, elastomer or non-ferrous alloy materials.

All fasteners, muff couplings and stem adaptors shall be of grade 316 stainless steel. Universal joints shall be of stainless steel and shall be provided with rubber gaiters for protection.

Copper alloy seals shall not be used on sewage applications.

PSB1.28.4 Fabrication

Fabrication of stainless steel shall comply with the fabrication requirements specified elsewhere in this document. In particular, welding shall be continuous and crevices shall be avoided.

Stainless steel shall be pickled and passivated prior to installation and again before commissioning.

PSB1.28.5 Installation

Penstocks shall be installed by the Contractor using personnel skilled in such installations.

Suitable gaps shall be left for the application of grout. Grout shall be of the non-shrink type and shall be applied strictly in accordance with the manufacturer's instructions. The first penstock to be installed shall be grouted under the supervision of the supplier and in the presence of the Engineer.

PSB1.28.6 Leakage Testing

Leakage testing shall be done under maximum expected pressure and after all installation work has been completed. No leakage between the penstock frame and the structure shall be acceptable.

The acceptable leakage rate shall be:

- 0,015 l/s/m of seating perimeter/3 m pressure head (for off-seating penstocks);
- 0,008 l/s/m of seating perimeter/3 m pressure head (for on-seating penstocks).

PSB1.29 VALVE ACTUATORS

PSB1.29.1 General

Valve actuators shall be electric unless otherwise specified.

The direction of operation of the handwheel shall comply with Clause "Valves for Liquids or Gases".

PSB1.29.2 Electric Actuators

Electric actuators shall incorporate three phase motors and shall be specifically matched to the design duty; Rotork IQ, or equivalent, for normal duties and Rotork IQM, or equivalent, for modulating duties.

Manual operation at the unit is required unless otherwise specified.

The actuator motor and gearbox shall form one integrated unit. Motors shall be for three phase, 400 Volt, 50 Hz supply, shall be Class F insulated (or better) and shall have an embedded thermostat for overload protection. The complete unit, including installation work, glands and controls shall be ingress protected to IP 68 unless otherwise specified.

In instances in which the opening or closing period is specified (e.g., to avoid water hammer) this period shall be achieved, without pulsing, by incorporating a suitable gear ratio to allow the motor to operate from fully open to fully closed without stop/starts. If it is not possible to achieve the specified duty without pulsing, the actuator/gearbox/valve

arrangement shall be designed to minimise frequency of motor switching and all design parameters shall be submitted to the Engineer for approval.

For open/shut duties, actuator torque rating shall be at least 200% of the start-opening or shut-off torque, whichever is higher, specified by the valve manufacturer for this application (after the gearbox mechanical advantage has been considered).

For modulation duties, actuator torque rating shall be at least 400% of the start-opening or shut-off torque, whichever is higher, specified by the valve manufacturer for this application (after the gearbox mechanical advantage has been considered).

All components of the drive shall be designed to prevent backlash.

The actuators shall incorporate the following features:

- ✦ hand operated gearwheel override operation incorporating open/close direction indication.
- ✦ visual position indication at the unit.
- ✦ the actuator shall initiate a trip if:-
 - it does not succeed in moving the valve within a suitable period.
 - the motor windings overheat.
- ✦ the actuator shall provide an impact effect to overcome:-
 - tightly seated valves.
 - an unintended loss of movement.
- ✦ the following information shall be fed back to the control panel or, if applicable, the SCADA system:-
 - valve position.
 - torque on output shaft.
- ✦ it shall be possible to configure the control instructions and interrogate the actuator status without removing covers.
- ✦ the terminal compartment shall be separately sealed from the actuator internals.

PSB1.29.3 Pneumatic Actuators

Actuators shall be designed to match their valves' operating requirements.

Actuators shall be fabricated of non-corrosive materials and shall be mounted using stainless steel mounts and couplings. Fasteners shall be of stainless steel.

Unless the system configuration clearly does not require it, automatic spring-closing shall be provided to ensure that the valve closes (if open) or remains closed (if closed) upon power failure or failure of the air supply. The spring shall be of stainless steel.

Linear actuators shall be provided with stainless steel cylinder piston, cylinder rod and attachments. For open/shut duties, actuator force rating shall be at least 200 % of the start-opening or shut-off force, whichever is higher, specified by the valve manufacturer for this application (after any mechanical advantage has been considered). Manual operation, by lever or equivalent, shall be provided in addition to pneumatic operation.

For open/shut duties of rotational actuators, torque rating shall be at least 200 % of the start-opening or shut-off torque, whichever is higher, specified by the valve manufacturer for this application (after any mechanical advantage has been considered). Manual operation, by handwheel or equivalent, shall be provided in addition to pneumatic operation.

The air supply to each actuator shall be fitted with a filter-regulator unit with an automatically operating water drain trap.

PSB1.30 BASEPLATES

PSB1.30.1 Common Baseplates

Both direct-coupled and belt-driven machines shall be mounted with their drivers on common cast iron or fabricated steel baseplates of rigid construction.

PSB1.30.2 Corrosion Protection

Steel baseplates shall be hot-dip galvanized unless specified otherwise in the Detailed Specification.

PSB1.30.3 Machined Mounting Pads

The baseplate shall incorporate machined mounting pads at the support and fixing positions of each item of plant and equipment to be mounted on the baseplate. On fabricated baseplates this machining shall be done after fabrication, stress relieving (if applicable) and hot-dip galvanizing are complete. The thickness of the solid pads shall be not less than 1,25 times the diameter of the holding down bolts. The pads shall not be provided with threaded holes for machine screws but shall be drilled for inserting through-bolts and adequate provision shall be made for reaching the nut with a suitable spanner. In the period between machining and installation of the equipment, the machined surface shall be protected against corrosion by a removable coating. After installation, a non-hardening compound, Tectyl or equivalent, shall be applied to exposed machined surfaces and to the crevice formed at the foot of the equipment.

The above design may be suitably modified if the Contractor uses a pourable resin based chocking system. Such chocks shall be at least 15 mm thick.

PSB1.30.4 Fasteners

Anchor fasteners shall be of grade 316 stainless steel with threads coated with a nickel-based, anti-seize compound before assembly.

PSB1.30.5 Alignment

Preliminary alignment shall be done at the factory to ensure that the baseplate has been correctly manufactured, but final alignment shall always be done on site after installation and grouting has been completed. Alignment shall be accurate and to the approval of the Engineer and a final alignment check witnessed by the Engineer must be carried out by the Contractor prior to start up.

PSB1.30.6 Shimming

Not more than three shims may be used at any point, and these must be made of a corrosion resistant material.

PSB1.30.7 Jacking Screws

At least two diagonally opposed jacking screws shall be provided for belt tensioning in the case of belt-driven units. Direct-coupled motors above 10 kW shall be provided with jacking screws for horizontal alignment and direct-coupled motors above 150 kW shall be provided with jacking screws for vertical alignment as well. Jacking screws shall be of grade 316 stainless steel.

PSB1.30.8 Grouting

Baseplates shall be so designed and grouted as to eliminate collection points for water or dirt. Except where otherwise approved in writing by the Engineer, all baseplates on concrete plinths shall be fully grouted in. Grouting holes must be provided on baseplates having a continuous top plate. Tapped holes and fixing setscrew protrusions shall be suitably protected.

The material used for grouting shall be a non-shrink, cementitious grout (ABE DuragROUT 1000, or equivalent). ABE Epidermix 324, or equivalent, is acceptable if the Contractor's design requires an epoxy grout to be used.

The initial grouting shall be overseen by the supplier's technical representative.

PSB1.30.9 Soleplates

In applications where baseplates are not practical, machined soleplates, suitably fixed and grouted to the concrete plinths, shall be provided. No machine may be mounted directly onto a concrete base without the use of either a baseplate or soleplate.

PSB1.31 GUARDS

Guards shall comply in all respects with the Occupational Safety and Health Act 2005 as amended and the following points shall also be noted: -

- a) Guards are required to cover all moving or revolving components of machinery. Guards which do not adequately cover moving protrusions such as keys, lock-nuts, lockwashers, setscrews, etc., or irregularities such as keyways, will under no circumstances be accepted.
- b) Guards shall be neatly and rigidly constructed and fixed and shall not vibrate or cause noise during operation.
- c) Where expanded metal or similar mesh is used, the mesh opening shall not permit a circular object 10 mm or larger to penetrate.
- d) Mesh shall not be used for chain guards but on belt drives the side of the guard most conveniently sited for inspection shall be constructed of expanded metal or similar. Mesh should similarly be used in other situations where inspection or ventilation is required.
- e) Guards shall completely enclose drives and shall entirely prevent a person from touching any moving protrusion.
- f) Allowance must be made for adjustment on belt guards or where adjustment will be required.
- g) It shall be possible to remove the guard easily for maintenance purposes.
- h) Guards shall preferably be fabricated of 316 stainless steel (uncoated) but may also be hot-dip galvanized, zinc-sprayed or aluminium-sprayed carbon steel, coated to

Specification in all these cases. Fasteners shall be M10 or larger and shall be of 316 stainless steel.

PSB1.32 ELECTRIC MOTORS

PSB1.32.1 Rating

All electric motors shall be rated for operation on a 3-phase, 4-wire, 400/230-volt, 50 Hz, AC supply at sea level, with an ambient temperature of up to 40°C. Full load speed shall not be more than 1500 rpm. The rated power of the motor shall be not less than 20% more than the maximum power requirement of the associated plant, except where the size of the motor is specified or as otherwise specifically approved by the Engineer. In addition, the motor shall be rated so that, with the method of starting and drive arrangement used, the maximum period for the motor to reach full operating speed shall not exceed 10 seconds.

PSB1.32.2 Specifications

Except as otherwise specified, motors shall be standard squirrel cage or slip-ring motors complying with SABS 948 as amended, with IP55 enclosure and IC0141 cooling, and suitable for a damp environment. Motors shall be suitable for both "continuous running duty", Duty Class S1, and "intermittent periodic duty", Duty Class S3. Windings shall be copper conductors insulated with Class F material with Class B temperature rise. The motors shall be suitable for 6 starts per hour, two of which shall be consecutive.

PSB1.32.3 Type

The type of motor (and starter if applicable) to be supplied is determined by the requirements of the application specified in the Detailed Specification and by the starting limitations specified in the Electrical Specification. In the absence of such specifications, a standard squirrel cage motor complying with this Clause shall be offered.

PSB1.32.4 Construction

Motor frames shall be of the totally enclosed fan cooled type with cast iron yoke frames and cast-iron end covers. The end covers and yoke shall be properly machined, and each cover shall locate on a spigoted register to ensure concentricity and parallelism. Bearings shall be of grease lubricated roller and/or ball type, provided with grease nipples (with extension tubes where access is restricted) and sealed to suit external use. Motors required for external use shall be fully weatherproofed.

PSB1.32.5 Terminal Boxes

Terminal boxes shall be top mounted wherever possible and arranged for cable entry from either side. The two ends of each stator winding shall be "brought out" to the terminal box. Squirrel cage motors shall be wired to permit both direct-on-line and star-delta starting.

PSB1.32.6 Thermistors

Motors between 55 kW and 150 kW (the latter not inclusive) as well as motors for variable speed drives shall be provided with thermistors embedded in the windings of each phase. The thermistor tails shall be "brought out" to separate terminals mounted near the motor

winding

terminal

block.

PSB1.32.7 RTDs

Motors rated at 150 kW and above, both fixed and variable speed, shall be provided with PT 100 type RTDs. Two RTDs shall be provided per phase winding. All six shall be incorporated into the control system, three to provide monitoring and three to provide high temperature trip.

PSB1.32.8 Heaters

Motors of size 75 kW and above shall be fitted with "pocket" heaters. The heater shall be mounted at the bottom of the motor frame and shall be replaceable without dismantling the motor.

PSB1.32.9 Slip-Ring Motors

Slip-ring (wound rotor) motors shall be of the totally enclosed fan cooled type with stainless steel slip-rings. The slip-rings shall be mounted inboard of the non-drive end bearing and be fitted and keyed to the shaft as a single unit. The terminal box shall be common to both stator and rotor connections.

The brush holders shall be manufactured from fibreglass and be removable from the terminal box as a complete unit. Where the current density in a single brush at the full operating load approaches or is above 80% of the capability of the brush then an additional brush shall be provided in a separate brush box.

PSB1.32.10 Variable Speed Applications

In applications where the motor speed is controlled by supply frequency variation, the motors shall be cooled by a separate, 50 Hz motor driven "piggy-back" fan. This requirement will be waived if the Contractor can provide test results to confirm that the drive and motor design with shaft mounted fan can operate in the application without overheating. This requirement does not apply to submerged motor applications.

PSB1.32.11 Hazardous Locations

When required to suit a hazardous location in terms of SABS 0108 or in terms of this Specification, suitable motors complying with SABS 969 or SABS 970, as appropriate, shall be supplied. The relevant SABS certificates, clearly indicating the location classification in which the machine may be operated, shall be submitted to the Engineer before delivery of the motors. Each motor shall be clearly and permanently marked with the applicable certificate number.

PSB1.32.12 Special Motors

Should the Tenderer wish to offer a different type of motor to those specified to obtain special starting characteristics and/or variable speed, a full technical specification of the motor must be supplied, and such specification shall be for the equipment to a standard at least equal to that of the motors specified above. No item of electrical protection shall

be

omitted.

PSB1.32.13 Warning

Motor manufacturers must be warned that the motors are to be installed in an extremely corrosive and often damp environment. All motors shall therefore be adequately protected.

PSB1.33 POWER TRANSMISSION**PSB1.33.1 Shaft Couplings**

Shaft couplings shall, wherever practical, be of the rubber-tyre or rubber compression type with taperlock bushes which shall be keyed to the shafts. After installation the alignment of all couplings shall be checked by the Contractor in the presence of the Engineer or a person delegated by him. Alignment shall be accurate and to the approval of the Engineer.

Spacer couplings shall be used in all cases where this will assist maintenance.

PSB1.33.2 Vee Belt Drives

Vee drives shall be designed to suit the power rating of the motor using service factors appropriate to the driving and driven machinery. Drives shall be designed, manufactured and installed in accordance with BS 3790 and ISO 4184, utilizing taper lock pulleys with taper locks keyed to the shaft.

Where alternative pulley diameters can be selected, preference must be given to the larger pulley diameters to minimize the belt loading on bearings.

Tenderers shall ensure that the bearing arrangements of driving and driven machinery are designed to cope with the loads imposed by vee-belt drives and shall incorporate lay shafts between plummer blocks where necessary. With lay shaft arrangements, Tenderers shall submit their design calculations and drawings for approval by the Engineer. Bearings shall be designed for an L_{10} life exceeding 100 000 hours. Plummer blocks shall be adequately sealed and shall be fitted with grease nipples. Bearing units incorporating open, shielded bearings are not acceptable.

PSB1.33.3 Motor Driven Gearboxes

Gearboxes shall, unless otherwise specified, be supplied with environmental protection to IP 55.

Gearboxes shall be selected using a service factor of 1,75 based on the drive rating and shall have an efficiency of not less than 96% on two stage reduction and 95% on three stage reduction.

Gears shall be case hardened, profile ground and lapped, helical and spiral bevel gears.

Roller bearings shall be used throughout. Bearings shall be designed for an L_{10} life in excess of 100 000 hours.

The gearbox housing shall be of rigid cast iron construction preferably split in the

horizontal

plane.

A breather designed to prevent moisture from entering shall be fitted.

Oil-bath gearboxes shall have suitable oil level indicators or dipsticks. Unless otherwise decided by the Engineer, the drain from the gearbox shall be extended beyond the base so that the oil can be easily collected. The drain line shall be of grade 316 stainless steel and shall be fitted with a ball valve and square-head plug.

Each gearbox shall be mounted on machined sole plates fitted with jacking screws to assist with alignment.

PSB1.34 MACHINE VIBRATION LEVELS

The mechanical vibration of machines measured at all important points such as bearings shall be lower than that specified as "good" for that class of machine in BS 7854 (ISO 10816).

PSB1.35 NOISE CONTROL

PSB1.35.1 Noise Levels

The sound power of any equipment shall not exceed 89 dB(A) (referred to 10⁻¹ Watts) unless specifically approved by the Engineer. This is approximately equivalent to a sound pressure level of 81 dB(A) at a radius of one metre from the acoustical centre assuming uniform hemispherical propagation in a free field on a hard floor. In certain instances, a lower noise level may be called for in the Detailed Specification.

Where the Contractor is unable to restrict the noise level of the machines to the maximum specified by the appropriate selection of suitable equipment, e.g., by selecting slow speed or silent type machines, quiet type cooling fans, suitable silencers, etc.; this shall be clearly pointed out by the Tenderer in his Tender so that appropriate steps can be taken at the design stage to counteract the effects of noise.

PSB1.35.2 Acoustic Treatment

Acoustic enclosures are not acceptable unless permitted in this Specification. Acoustic treatment of high noise sources where this can be done without greatly interfering with operation or maintenance must, however, be included where applicable.

When acoustic lagging is called for in the Detailed Specification this shall consist of a 100 mm thick layer of rockwool having a density of 60 kg/m³, suitably fixed in place and reinforced to prevent collapse, and covered with 25 mm thick asbestos free plaster having a density of 1 000 kg/m³ (I.P. Insultex AF720, or approved equal). The outer surface shall be finished off with scrim cloth before being painted.

It is not necessary to lag flow meters and cast-iron valves on acoustically lagged pipelines.

Components which can move, such as those associated with expansion bellows or flexible couplings, shall be enclosed by an effective acoustic enclosure designed to prevent sound transmission but able to cope with movement without damage.

PSB1.36 THERMAL LAGGING

Not used

PSB1.37 BEARINGS

Bearing systems shall be designed to provide safe shut down without damage under normal stoppages as well as electrical supply failure.

PSB1.38 LUBRICATION**PSB1.38.1 Grease Lubrication**

Grease lubrication is preferred, and all greasing points must be easily accessible.

Equipment with multiple greasing points shall be provided with grease lines which are piped, separately, to a single easily accessible position.

In cases in which motorised lubrication is provided to more than one destination; a distributor shall be provided. The distributor shall be a positive displacement device which ensures equal, successive lubrication to all destinations.

Pipework for grease distribution shall be of stainless steel or non-ferrous metal.

PSB1.38.2 Oil Lubrication

When oil lubrication is necessary, the Tender Prices shall include for the initial oil fill and the first oil change, including flushing, draining and filling, after an initial run-in period not exceeding 3 months.

Oil level indicators shall be fitted for visual checking. Drain cocks, including 316 SS fittings where necessary to permit convenient draining, and plugged at the end, shall be provided for oil reservoirs exceeding 1,5 litre capacity. Drains shall be from the lowest point and syphon type drains are unacceptable.

Lubrication systems shall be designed to exclude dirt and moisture. Air vents on the oil reservoir shall contain an air filter.

PSB1.39 SCREW PUMPS

Not used

PSB1.40 CENTRIFUGAL PUMPS**PSB1.40.1 Pump Duty**

Details of pump duties are given in the Detailed Specification and the type of pump and materials of construction shall at all times be selected to suit the duty.

PSB1.40.2 Type

Centrifugal pumps shall, wherever feasible, be of the single stage, end suction, back pull-out type, direct coupled to the motor using spacer type couplings and complete with common baseplate and coupling guard. Close coupled pumps may be used on clear water applications for motor sizes up to 2,2 kW.

PSB1.40.3 Pump Speed

Pump speeds shall not exceed 1 500 rpm.

PSB1.40.4 Pump Motor Speed

Pump motor speeds shall not exceed 1 500 rpm with the following exceptions:

- a) On small (5,5 kW and smaller), high head, low-capacity duties, tenderers may submit two-pole speed installations as an alternative offer.
- b) Where the use of speeds above 1 500 rpm avoids the need for of a multi-stage pump, tenderers may submit two-pole speeds as an alternative offer.

PSB1.40.5 Performance Parameters

Performance characteristics shall be suitable for parallel operation with pump head increasing continuously to shut off. The pump shall be selected to operate as close as possible to best efficiency at duty point and shall be adequately sized to safely permit an increase in capacity of at least 25 % should the head be lower than estimated. The impeller diameter fitted to direct coupled pumps fitted shall not exceed 95 % of maximum impeller diameter for the volute/diffuser provided.

PSB1.40.6 Margin of Power

A non-overloading absorbed power characteristic, preferably with maximum power absorbed at best efficiency, is strongly preferred. The motor's continuously rated power shall exceed the greater of the following:

- a) 10 % above the maximum power demand under any condition of operation for the pump, including open discharge.
- b) 20 % above the pump's maximum power demand over the full range of flow and pressure conditions anticipated in the pump installation.

PSB1.40.7 Life

Pumps and motors shall be designed for long life under continuous operation. Bearings shall be designed for an L₁₀ life of not less than 50 000 hours.

PSB1.40.8 Lubrication

Unless otherwise specified in the Detailed Specification, bearings shall be grease lubricated and adequately sealed against the ingress of moisture or dirt.

PSB1.40.9 Vibration

Rotating elements shall be balanced and vibration severity of the unit during operation shall not exceed $V_{rms} = 1 \text{ mm/s}$ at the pump and motor bearings.

PSB1.40.10 Pump Glands

Pump glands shall be arranged as follows:

- a) **For clear, non-aggressive liquids up to 200 kPa** discharge pressure - shaft sleeve with packed gland or mechanical seal.
- b) **For clear non-aggressive liquids at pressures above 200 kPa and for clear corrosive liquids at any pressure** - 316 stainless steel shaft sleeve with mechanical seal.
- c) **For liquids with solids in suspension at any pressure** - packed gland with hardened stainless steel shaft sleeve and grease seal. If a mechanical seal is specified, the pump gland shall be arranged to suit a clean water flush. A throttle bushing made of a suitable non-corrosive; self-lubricating material shall restrict the flushing water flow into the pump. Mechanical seals for such applications shall have silicon or tungsten carbide sealing faces.

PSB1.40.11 Venting

A vent cock shall be fitted to the highest part of the casing.

PSB1.40.12 Connections

Suction and discharge connections shall be flanged except on 40 mm connections and smaller which may be screwed. In the latter case, unions shall be incorporated in the pipework close to the suction and discharge connections. As a rule, flexible couplings shall be fitted close to the suction connection of all pumps.

PSB1.40.13 Isolating and Check Valves

Isolating valves shall be provided close to the suction and discharge connections of all pumps. A check valve shall also be fitted between the discharge isolating valve and the pump except where reverse flow through the pump when stationary cannot occur. Valves shall be sized to suit the pipe sizes and not the pump connection sizes. Any reducing necessary shall be done immediately next to pump connections.

PSB1.40.14 Pressure Tapping Points and Gauges

Pressure tapping points shall be provided near the suction and discharge connections of each pump located, wherever possible, on a straight length of pipework where readings will be as steady and accurate as possible. Suction and discharge pressure (or suction, as applicable) gauges shall be fitted at these tapping points.

PSB1.40.15 Strainers

A centrifugal pump which draws from a tank or sump shall be protected by a strainer, suitably designed for the installation. The strainer shall be installed between a shut-off valve and the pump.

PSB1.41 SUBMERSIBLE AND IMMERSIBLE PUMPS**PSB1.41.1 General**

Details of the duty and performance requirements of submersible and immersible pumps to be supplied are specified in the Detailed Specification.

Submersible sewage pumps shall be provided with a facility to prevent crusts as well as debris and sludge collection on the floor. This shall operate automatically whenever a pump is started.

PSB1.41.2 Submersible Pumps

The motor shall be close-coupled to the pump and separated from the pump casing by an oil chamber. A mechanical seal shall isolate the motor from the chamber and a mechanical seal with tungsten or silicon carbide faces shall seal the oil chamber from the liquid to be pumped. The rated output of the motor shall be 15 % in excess of the maximum power which can be absorbed by the impeller fitted to the pump at any duty, i.e., the unit shall be non-overloading. Pump speed shall not exceed 1 500 rpm.

The motor shall be shut down automatically in the event of leakage through either seal or because of overheating of stator windings.

Pumps handling raw sewage, primary sludge, activated sludge or similar shall be of a non-chokeable type with open impellers, and shall be capable of handling a solid size of 100 mm diameter or greater. Impellers designed specifically for the application are preferred. These duties must be regarded as abrasive.

Pumps required for abrasive duties shall be designed for low wear. Low operating speeds shall be used. The suction cover shall incorporate a replaceable liner of a suitable abrasion resistant material such as high chrome iron. The design shall permit easy adjustment of the clearance between the impeller and suction cover.

All sewage duties shall be considered to be corrosive.

The shaft, all fasteners and all steel components in contact with the pumped liquid shall be of grade 316 stainless steel or better. The pump and motor casing shall be of high-quality, close-grained cast iron. A suitable, heavy-duty epoxy or polyurethane coating system with a minimum thickness of 400 µm shall protect the pump unit internally and externally.

PSB1.42 DRAINAGE PUMPS**PSB1.42.1 General**

This Clause applies to drainage pumps to be provided for applications involving seepage, slow leakage, etc. Drainage pumps which are to prevent accidental flooding or other large inflows of water shall be specifically designed for the application by a pump engineer.

PSB1.42.2 Pump

Pumps shall be of the free-standing, submersible sewage, heavy construction, cast-iron type (Zenit Draga or equivalent). Drive motors shall be three-phase units with oil bath and shall have protection to IP 68. The shaft shall be of stainless steel. Switching shall be done in accordance with liquid level by a float switch on cable (rotating arms will not be acceptable).

PSB1.42.3 Installation

Drainage pump installations shall comply with the following:

- a) The discharge pipework shall be rigidly supported at a distance not exceeding 1 000 mm. The discharge point shall be indicated by the Engineer.
- b) The discharge pipework shall incorporate a check valve on the initial upward run of pipework.
- c) The pump's discharge shall be connected to the discharge pipework via a clear flexible hose. It shall be possible to remove the pump and check valve without damaging the pipework.
- d) Discharge pipework shall be of uPVC, Class 12 or higher.
- e) The area of the outlet pipework shall not exceed 200 % of the area of the pump outlet.
- f) Discharge pipework shall be sloped up away from the pump at all points apart from a single final straight run to the drain which may slope downwards at any angle.

PSB1.43 POSITIVE DISPLACEMENT PUMPS**PSB1.43.1 Type**

"Positive displacement pump" refers to both progressing cavity pumps and peristaltic pumps.

Positive displacement pumps shall be suited to handle the fluids specified.

If the fluid to be pumped is sludge, it shall be noted that this contains solids, fibrous matter and grit. Construction materials shall be selected accordingly and the pump size shall be conservatively selected to ensure a very low operating speed. All universals, pins, bushes and so forth operating in the pumped liquid shall be properly lubricated and must be fully sealed.

PSB1.43.2 Duty

The pump duty will be specified in the Detailed Specification.

PSB1.43.3 Drive Arrangement

Each pump shall be direct coupled to a motor/gearbox unit to suit the range of pump duties. The complete drive unit shall have an ingress protection rating of IP 55 or higher. The pump and drive unit shall be mounted on a common fabricated steel baseplate complete with all necessary guards.

All components shall be conservatively selected to suit the specified type of duty with continuous 24 hour per day operation. The continuously rated output of the motor shall exceed the power required at maximum duty and at the worst operating condition by not less than 30%. The gear unit shall be selected using a service factor of not less than 2, based on the installed motor power.

If applicable, the unit must be prevented from reverse rotation.

PSB1.43.4 Variable Speed Drive

Pumps in variable speed applications shall have their drive motors controlled by electronic variable frequency convertors which are suitably rated for the torque required by the application. The convertor shall be housed in a cubicle in the electrical control panel which is normally in a separate room. The motor and VFC shall be of suitable design and shall be adequately sized to provide the high torque requirements of the pumps under all operating conditions, particularly start up.

PSB1.43.5 Drive Unit Protection

When pumping sludge, it is possible for the pumps to block or seize or have abnormally high starting torque requirements, particularly when operating on a duty/standby rotation basis. The complete installation shall be designed to cope with such operating conditions without damage to equipment.

The drive unit shall be rated to withstand such shock overloads at any torque produced by the motor between full speed and shock stall without any damage. **If any part of the unit could be damaged under such conditions, suitable safeguards shall be incorporated.** Thermal overloads on the motor shall not be regarded as adequate in such a case.

If an overload safeguard system is necessary to protect against overload damage, the system used shall disconnect the load immediately an overload occurs, switch off the unit, activate an alarm indication on the control system and initiate the shutdown of other equipment if this is necessary. A sealed, adjustable, and resettable torque limiting coupling, such as "Bibbigard" or approved equal, between the pump and drive unit would be acceptable. The coupling must be set for the maximum torque which the drive unit can safely handle.

Full details of the drive system must be provided with the Tender.

PSB1.43.6 Pump Flushing System

A DN 50 connection shall be provided downstream of a check valve on the suction line of all pumps. A DN 50 flushing line from the domestic water supply, or the service effluent water system (if applicable), shall be connected to this. On each branch a solenoid valve, isolating valve, by-pass with isolating valve and check valve shall be fitted. This system shall automatically flush the pump before each start up and shut down. Manual flushing shall also be possible using the by-pass.

Where a system such as that described above is not possible on, for example, a direct feed hopper system, then an alternative flushing system such as a hopper flushing system

shall

be

devised.

PSB1.43.7 Pressure Switches

Where pressure switches are used to protect the pumps against closed or blocked lines by interrupting the supply to the motor, a pressure switch be mounted on the pump outlet and a vacuum switch shall be mounted on the pump inlet.

When used on sewage, sludge, chemical or other applications where blockage or corrosion of the switch is possible, the switches shall be protected by a diaphragm type, liquid filled chemical seal. The portion of the seal in contact with the process liquid shall be suitably corrosion resistant and, when solids are handled, shall have a large threaded socket connection not smaller than 1" BSP.

The switch and its seal shall be mounted on the top leg of a cross with two plugged connections. The cross shall be mounted on the side of the pipe and the bottom and second side connection of the cross shall be plugged, but arranged so that effective cleaning or flushing of connections can be done. An isolating valve shall be provided to permit isolation of the cross from the pipe (see drawing at end).

PSB1.43.8 Pressure Gauges

A suitably rated pressure or combination pressure/suction gauge shall be installed on the suction and discharge of each pump.

PSB1.43.9 General

The following shall be provided for each positive displacement pump:

- a.) A suitable check valve on the discharge pipework.
- b.) Protection against running against a closed discharge, i.e., discharge pressure switch or pressure relief valve.
- c.) Protection against running dry, i.e., suction pressure switch, pump stator temperature switch or low flow signal from related flow meter.

PSB1.43.10 Progressing Cavity Pumps

Progressing cavity pumps shall be installed in compliance with all requirements of this Clause.

The layout of progressing cavity type pumps shall be such that the glands are under the lowest of suction or discharge pressure.

PSB1.43.11 Peristaltic Pumps

Peristaltic pumps shall be installed in compliance with all requirements of this Clause.

PSB1.43.12 Spares

For each progressing cavity pump provided in terms of this Contract, one spare rotor and one spare stator shall be provided as part of the Contract.

For each peristaltic pump installed, one spare hose and ten complete lubricant fills as

well as a complete set of tools for replacement of the hose shall be provided as part of the Contract.

PSB1.44 METERING PUMPS

PSB1.44.1 Pumps

Metering pumps shall comply with the applicable design and installation requirements for positive displacement pumps but shall, in addition, comply with the following:

- (a) Pumps which feature diaphragms shall be configured or protected so that diaphragm breakage will not lead damage to the internal part of the pump.
- (b) All pump fasteners shall be of stainless steel.

PSB1.44.2 Pump Installation

The following requirements shall be provided for metering pump installations:

- (a) Pumps shall either be mounted on a wall or other rigid vertical mounting surface or shall be mounted on plinths above ground level.
- (b) Pumps shall be provided with an automatic pressure relief system in order to prevent overloading within the pump.
- (c) Pumps shall be provided with check valves downstream of their outlets.
- (d) The pipework on the inlet and outlet of pumps shall be provided with isolating valves and couplers to allow removal of the pumps without dismantling of the surrounding pipework.
- (e) Strainers shall be provided upstream of the pump inlet. The strainers shall be designed and installed in a manner which will allow cleaning of the strainer element without uncontrolled spillage. Strainers shall be provided with inlet and outlet isolating valves.
- (f) A facility for connection of a flushing water pipe shall be provided. Permanently connected flushing water systems shall be provided where specifically called for.
- (g) The piping in the vicinity of a metering pump shall be provided with a drain facility which shall be designed to minimise the amount of dosing fluid which would be lost during removal of the pump from the pipework.
- (h) All mounting fasteners and mounting brackets shall be of grade 316 stainless steel.

PSB1.45 PUMP SUCTION STRAINERS

PSB1.45.1 General

Where specified, strainers shall be installed on the suction side of centrifugal and positive displacement pumps which draw from an open tank, channel, sump, reservoir, etc.

PSB1.45.2 Type, Design and Arrangement

Strainers shall preferably be of a proprietary type, A.R.I Semi Globe Filter, Krombach y-type, or equivalent and shall be of the double-flanged configuration. The basket type of strainer element is preferred in order to facilitate removal of captured solids.

The strainer element opening diameter shall be decided in conjunction with the Engineer.

Suitably rated pressure gauges or combination pressure/negative pressure gauges shall be installed on both the inlet and outlet branch.

Strainers whose baskets exceed 25 litres in volume shall incorporate:

- a.) top pull-out configuration.
- b.) a lifting device, such as a lifting beam with hoist or a davit arrangement, and the strainer basket shall be provided with a suitable lifting eye.
- c.) a hot-dip galvanized steel support or concrete support plinth.

The ratio of open area in the basket to inlet pipe area for non-proprietary units shall be designed to suit the application but shall exceed 7. Baskets shall be made of stainless-steel perforated plate with an opening size to be decided in conjunction with the Engineer. If the Engineer approves the use of wire grid for baskets, the wire shall be of at least 2 mm diameter and shall be of stainless steel. Baskets shall be robustly constructed, shall be provided with adequate flow passages between the strainer element and body and shall withstand the differential pressure developed when a basket is partially blocked. Flat surfaces shall be adequately braced to prevent sag. Lids shall be located at the top of strainer housings, shall incorporate an O-ring type seal and shall be secured with grade 316 stainless steel fasteners. Handles shall be provided on baskets of 25 litres or smaller.

PSB1.45.3 Corrosion Protection

Strainer housings and lids shall be either:

- coated cast iron.
- 316 stainless steel.
- glass reinforced plastic.
- plastic; or,
- Hot-dip galvanized carbon steel.

Coated carbon steel shall only be acceptable if the design is such that internal scraping of the surface is unlikely to occur. In such cases, System A/1 or System A/4 or System "Fusion Bonded Epoxy" will be acceptable.

PSB1.45.4 Testing

Strainer bodies shall be pressure tested to a minimum of 500 kPa and vacuum tested to 70 kPa before delivery to Site.

PSB1.46 VERTICAL SHAFT MIXERS

PSB1.46.1 Mixing Performance Tests

The Contractor will be required to test the performance of the mixers when commissioning the plant. This test shall consist of taking a minimum of six samples at random points close to the surface and from the bottom of the compartment within five minutes. Duplicate analysis of these samples for suspended solids concentration will then be carried out in a suitable laboratory and the average concentration calculated. The suspended solids concentration of any one sample shall not differ from this average by more than 200 mg/l.

If the equipment fails to pass this performance test, a second test may be carried out. If

the mixers still fail the test, the Contractor shall increase the mixing capacity of the equipment and shall achieve compliance with the performance requirements at no additional cost to Council.

PSB1.47 SUBMERSIBLE MIXERS

Details of the mixer application and performance requirements will be given in the Detailed Specification. In general, the mixers are required to thoroughly mix the contents of the tank or chamber, to keep solids in suspension throughout the volume and to prevent a crust forming on the surface.

The mixers shall be submersible with a propeller integrally mounted on a submersible motor. The motor shall be separated from the propeller by an oil chamber. A suitable seal shall isolate the motor from the oil chamber and a mechanical seal with tungsten carbide faces shall seal the oil chamber from the mixed liquid. If the mixer incorporates a gearbox an additional seal shall be provided to isolate the gearbox oil system.

The mixers shall automatically shut off in the event of water contamination of the oil, loss of oil, excessive stator temperature, earth leakage or motor overload and suitable probes and switches shall be provided.

Each mixer shall be provided with one flexible cable to accommodate all the required connections within the machine. Cable lengths shall suit site requirements but a minimum length of 7 metres shall be allowed for.

Propellers shall be of a type suitable for handling stringy solids and thick sludges and shall preferably not require a shroud. The motor shall be of adequate size to perform the required duty with sewage sludges having a dry solids content of over 6% by weight.

The mixer shall be of rugged cast iron construction coated with a heavy-duty epoxy corrosion protection system at least 400 µm thick. If a shroud is necessary, this shall be ruggedly and rigidly fixed with the shroud and all brackets made of a non-corrosive material.

Each mixer shall be mounted with a sliding bracket on a guide column which is located on the floor of the tank and fixed at the top of the tank with a suitable bearing or turntable. It shall be possible to rotate the mixer through an angle of 180° while the mixer is operating and to fix the direction and height in the position selected. The guide column shall extend above the walkway level, as required to suit the specified lifting arrangements.

The operating cross bars or handles, the locking arrangement and the fixing arrangement shall not intrude into any walkway and shall not present a hazard in any way. If necessary, operating levers shall be easily removable.

Tenderers shall advise whether they consider it to be advisable to allow for variation in mixer inclination in the vertical plane and shall design accordingly.

Suitable lifting arrangements shall be provided for removing each mixer. The general design of the sliding bracket and lifting arrangement shall allow one man to lift the mixer without any jamming, wedging, or sticking.

Each lifting arrangement shall incorporate a davit and winch generally complying with the General Specification except that the guide column and turntable may form part of the arrangement. The height of the davit shall be such as to permit the mixer to be swung over the handrails along the walkway. Should the Tenderer consider that the guide column height will be too high with the above arrangement, and then an alternative system with

gates in the handrailing at each mixer will be considered. Removable handrail sections shall not be proposed as an alternative.

The guide columns and the entire mounting arrangement and lifting device shall be adequately supported and sufficiently rigid to prevent vibration or noisy operation.

Guide columns, support brackets, etc., shall be of hot-dip galvanized carbon steel (and painted as specified) or of 316L stainless steel. All fasteners, guide pins, turntables, bearings, fixing pins, chains, pivot pins, etc., shall be of 316L stainless steel or, where applicable on items such as bushes, of non-corrosive materials.

Where the mixers are required to operate in sumps or other containers in which the level varies, the mixers shall be designed and arranged to permit the lowest possible operating level and Tenderers shall state the minimum submergence required. Level controls shall be provided to stop the mixer at the lowest level and restart again at a suitable higher level (except as otherwise specified in the Detailed Specification).

PSB1.48 SCREW CONVEYORS

PSB1.48.1 Screw Conveyors - General

Details of the duty, performance, and any other special requirements for screw conveyors to be supplied will be given in the detailed specification. Conveyors shall comply with the following:

- The conveyor shall be conservatively sized and shall be suitable for handling at least 35 % in excess of the maximum duty specified in the detailed specification. The conveyor shall also be designed to operate well within the maximum design limits for the type of duty specified.
- A receiving conveyor shall operate at a capacity of at least 5 % above that of its supply conveyor.
- All units must be suitable for operating at any duty between no load and full load, either wet or dry, 24 hours per day.
- The conveyor shall be of rigid construction and shall be designed for a life before major repair of not less than 10 000 hours. Each unit shall operate quietly and without spillage or leakage. Protection shall be provided against damage from blockage or jamming.
- All radial and thrust loads shall be taken by the screw bearing and shall not be transmitted to the driver.
- All greasing points shall be piped to a convenient accessible position, but the system shall provide positive lubrication of each point, i.e., lines shall not be manifolded.
- The conveyor shall be driven by direct coupled motor and gearbox. Couplings shall be "Fenaflex", or approved equal, tyre-type couplings with taperlock bushes keyed to the shaft. Guards shall totally enclose the drive.
- Conveyors shall be designed for resistance to corrosion. All fabrications such as screws with centre tubes, troughs and covers, supports, guards, etc., shall be manufactured of coated 3CR12, coated 304L stainless steel or of 316L stainless steel. All shafts, pins, fasteners, hangers, sleeves, bushes, rollers, gland followers and other small items shall be made of grade 316 stainless steel or of another non-corrosive material.

- On proprietary items such as motors, gearboxes, couplings, sprockets, etc., particular care shall be taken to apply suitable protective coatings. Welding shall be continuous all round to prevent any crevices and all bolted and other mating faces and mounting pads shall be sealed during assembly with a suitable non-hardening sealer.
- Trough covers shall be light and easily removable but rigid and strong and shall be of a non-corrosive, UV-resistant material. Covers shall be hinged for inspection purposes and to serve as a relief in the event of blockage in the following positions:
 - at the discharge point and in line with the screw axis.
 - near the inlet.
- Fixing, supporting and structural arrangements shall consider the very high prevailing winds.
- Special care shall be taken to prevent sharp edges on items fabricated from thin sheets. Such sharp edges shall preferably be eliminated by design.

PSB1.48.2 Shafted Conveyors

Shafted screw conveyors shall, additionally, comply with the following:

- a) The conveyor screw shall be kept clear of the trough and shall be supported at both ends by rolling element bearings. These bearings shall be totally enclosed in coated cast iron or stainless-steel housings which shall be adequately sealed against the ingress of moisture and dirt and shall be mounted external to the trough.
- b) With inclined conveyors, the upper bearing shall be the thrust bearing and the bottom bearing shall be mounted clear of the trough and cover. In this case the shaft through the bottom cover shall be sealed by means of a gland incorporating at least one throttle bush, a lantern ring, at least three rings of packing, a positively driven, "Stellited", 316 stainless steel, slip fit shaft sleeve with o-ring seal and 316 stainless steel gland follower. The gland shall be grease sealed or water flushed depending on the application.
- c) The centre tube shall preferably be rigid enough to avoid the use of intermediate bearings. Where the use of intermediate bearings cannot be avoided, they shall be supported by suitable slim hangers which will not interfere with the flow of the product being conveyed. The screw shall also be sized so that the bearing is not immersed in the product being conveyed. The bearings shall be very well sealed, and grease lubricated.
- d) Provision shall be made in the conveyor design for easy replacement of items such as end bearings, intermediate bearings, throttle bushes, shaft sleeves, coupling tyres, chains, etc., without excessive disassembly and without removal of the complete unit. The general arrangement shall permit convenient access to all parts of the unit and shall permit easy installation or removal.
- e) Where appropriate, the screw conveyor shall be designed for abrasion resistance. All applications handling grit or sludge shall be regarded as highly abrasive. The conveyor shall be designed for slow speed and very low rubbing velocities. Outer edges of the conveyor screws shall be manufactured of, or lined with, an abrasion and corrosion resisting material. The trough shall be completely lined using conveniently replaceable 1 000 mm long sections made of a corrosion and abrasion resistant material. Alternatively, the trough shall be lined to a minimum thickness of 6 mm with a suitable

repairable material such as neoprene, polyurethane, ceramic lining compound, etc. Full details of the manufacturer's proposals shall be provided with the Tender.

The helical shall be fabricated from material with a thickness of not less than 6 mm.

PSB1.48.3 Centreless Conveyors

Centreless screw conveyors shall, additionally, comply with the following:

- a) The material thickness of the helical outer surface shall be at least 20 mm.
- b) The liner on which the spiral rests shall consist of a polymer featuring a two-colour laminate designed to act as a wear check. Thickness of the liner shall be at least 10 mm.
- c) The complete body shall be of grade 316 stainless steel.
- d) The drive motor shall preferably be mounted at the high point of the conveyor.

PSB1.49 INSTRUMENTATION

Calibration of each instrument shall be done to the approval of the Engineer.

Instruments and their cabling shall be protected so that electromagnetic interference does not affect their operation and signal transmission.

Environmental protection shall be as follows:

- (a) Instrumentation, including associated displays and transmitters, located either outside and above ground level or inside shall have IP 55 or higher rating.
- (b) Instrumentation, including associated displays and transmitters, located in underground chambers shall have IP 68 environmental protection and shall be mounted in an enclosure.
- (c) Outside mounted instruments (in cases in which the mounting arrangement allows), and their displays and transmitters shall be mounted in enclosures. Enclosures shall be of polycarbonate construction with transparent front, Fibox EK or equivalent. The complete enclosure installation shall have an IP 55 rating or higher. The enclosure size shall be chosen to provide a clearance of 100 mm all-round the instrument.

PSB1.50 MAGNETIC FLOW METERS

Meters

Magnetic flow meter sensors shall be full-bore, in-line, double-flanged units with remotely mounted transmitters. The transmitters shall provide local flow indication and 4-20 mA output. Sensors shall, unless otherwise specified, have IP 68 protection and transmitters shall have IP 67 protection.

Magnetic flow meters shall have polyurethane lined stainless steel tubes with either

Titanium or Hastelloy C electrodes. Accuracy shall be $\pm 1\%$ of flow or better. Rubber linings are acceptable for treated water applications.

Calibration shall be in litres per second unless otherwise specified.

For applications other than for treated water, flow meters shall be provided with an electronically operated electrode cleaning device. Automatic, timed cleaning shall be provided.

Installation

The equipment shall be correctly installed, connected, adjusted and calibrated by competent persons. Calibration shall be done in the presence of the Engineer. The operation and signal transmission of meters against electromagnetic interference shall be provided.

The meter shall be installed with a straight pipe length of at least 10 pipe diameters upstream of the sensor and a straight pipe length of at least 5 pipe diameters downstream of the meter. If this is not possible, specific measures shall be taken to provide flow straightening. The complete meter installation shall comply with the manufacturer's instructions.

Grounding rings shall be supplied and installed if the application requires these.

Testing

A factory test calibration certificate shall be provided for each flow meter.

The flow meter shall be provided with a simulation test unit for field verification of the measuring system without removal of the sensor. If more than one identical model flow meter is installed, two simulation test units shall be provided.

PSB1.51 GAUGES

Gauges – General

- a) Gauges shall be of durable, industrial construction. Case and bezel shall be of stainless steel unless this material is unsuitable.
- b) Scale markings shall be radial, plain, straight, black lines on a white background and shall be spaced so that one scale division represents approximately 1% - 1,5% of the maximum scale value in values of 1, 2 or 5 multiplied by any power of 10 to suit the maximum operating rating.
- c) On circular gauges the scale shall be concentric and the maximum and minimum scale values shall be near the bottom of the gauge, with the scale symmetrically disposed about the vertical centre line of the gauge.
- d) The tip of the pointer shall be of the knife edge type extending across the scale divisions and shall be as close as practical to the dial.
- e) Wherever applicable, **gauges shall be clearly, strip marked in green to indicate the normal operating range and in red to indicate the non-permissible range of values.** Such markings shall always be on the inner scale face and not on the glass face.
- f) The units of measurement shall be clearly marked on the dial. A printed label of approved non-corrosive material indicating the duty of the gauge shall be neatly fixed

on or near the gauge.

Gauge Installation and Mounting

Gauges shall be installed and mounted in accordance with the following:

- a) Gauges shall be mounted vertically and in such a position that they can be easily read from floor level. If this cannot be done, the Engineer's requirements shall be ascertained.
- b) Nozzles shall be provided for gauge tappings. Nozzles shall comply with the requirements of the Clause "Pipework".
- c) Gauges for rotational equipment, such as for centrifugal and reciprocating pumps, shall not be mounted directly on pipework but shall be mounted on walls or on pedestal stands mounted so as to avoid vibration. Gauge cocks shall be provided at each end of the connecting pipework.
- d) Pressure gauges shall be fitted with an isolating and air bleed cock of the type which has handle in line with the bore of the cock when the cock is open.
- e) Pressure gauges used on sewage, sludge, powder, chemical or other applications where blockage or corrosion of the gauge is possible, shall be fitted with a diaphragm type chemical seal, both being liquid filled. The portion of the seal in contact with the process liquid shall be of a suitable non-corroding material and, when solids are handled, shall have a large threaded socket connection not smaller than 1" BSP. With liquids containing solids, the gauge and seal shall be mounted on top of a side-mounted cross having one horizontal and one vertical connection plugged, so arranged to permit cleaning (see drawing).

Pressure Gauges

Pressure gauges shall comply with the following:

- a) Pressure, vacuum or compound gauges shall comply with SABS 1062. Gauges shall be of Accuracy class 1.6 and Durability grade A unless otherwise specified. The gauges shall bear the SABS standardisation mark.
- b) Gauges shall have a scale diameter of not less than 100 mm.
- c) Calibration shall be in kiloPascals with the full scale reading between 1,5 and 2 times maximum actual operating pressure except where otherwise specified.
- d) All gauges shall be suitable for continuous operation and shall be liquid filled on all pump applications and where fluctuations in pressure may cause damage.
- e) Gauges shall not be mounted directly on equipment subject to vibration.
- f) For dry locations indoors, the casing may be reinforced plastic or epoxy coated aluminium and the elastic element and shank of stainless steel. For damp indoor locations, particularly in any location where sewage is flowing, and for all locations outdoors, the gauges shall be weatherproof and have the cases and other metal components of grade 316 stainless steel.
- g) When used on steam lines a siphon shall be fitted between the steam line and the gauge which shall be filled with water before putting the gauge into service.

Temperature Gauges

Temperature gauges shall comply with the following:

- (a) Temperature gauges shall have dials not less than 120 mm diameter. Accuracy shall be $\pm 1\%$ of reading or better.

- (b) The gauges shall be fitted vertically into removable 316 stainless steel wells and the gauges shall be removable without leakage from the pipe or vessel. Protrusion into a pipeline shall be kept to a minimum. When handling sludge, sewage or other abrasive liquids the protrusion shall not exceed 15 mm and in this case the wells shall also be of a heavy-duty abrasion resistant type.

PSB1.52 CHLORINATION SYSTEMS

The design of plant installations for chlorination shall suit the application concerned but shall comply, as a minimum, with SABS 0298.

PSB1.53 CONTROL SYSTEMS

General

General requirements for all control systems are as follows:

- (a) All control systems, instrumentation, indication, actuation and other equipment which is necessary to provide an efficient, safe, reliable and easy to operate system in accordance with the requirements of the detailed specifications shall be provided.
- (b) Control shall function as an integrated, coherent system.
- (c) Protection systems with interlocks to prevent maloperation, including incorrect sequencing, and to prevent or limit damage to equipment resulting from operating conditions or equipment failure shall be provided.
- (d) Emergency stop stations shall be provided next to each motor driven unit.
- (e) The failure to start, tripping or stopping of any item of equipment shall prevent the start-up or shall initiate the appropriate shut-down procedure of related equipment as and when necessary.
- (f) Full details for control systems, sequences, logic charts, protections, control panel layout and design, etc., shall be submitted to the Engineer for approval before manufacture. These shall include drawings and circuit diagrams.
- (g) Indication of measured parameters on digital indicators shall be given to three significant places (or more, but not fewer than three).

PSB1.54 SCADA SYSTEMS

Control systems which utilise computer-based SCADA shall incorporate the following:

- (a) The control system shall be configured so that the equipment is PLC controlled to the extent that the installation can operate under SCADA failure.
- (b) Functions and information relating to a single item of equipment shall normally be provided on the control panel, MCC or other electrical panel. Functions and information relating to overall control shall normally be provided on the SCADA system.

- (c) Mimic screens provided for SCADA systems shall, where applicable, include at least the following:
- Overview of scheme; including the process flow diagram and indicating all electronically monitored parameters if these are not included in a sub-system.
 - Overview of each separate installation.
 - Individual unit (Centrifuge, compressor, pump-set, etc.).
 - Equipment sequence selection.
 - Equipment start interlocks.
 - For each motor larger than 55 kW, motor status and, where applicable, motor protection relay diagnostic.
 - Electrical reticulation schematic.
 - Hardware diagnostic.
 - Alarms.
 - Set-points for alarm, trip and control loop functions (including password protected alteration facility).
 - Record of equipment and process parameters at instant of equipment trip and station trip.
 - Trending of all monitored system parameters, with separate screens for logical groupings from an operating point of view.
 - Communication status of control system hardware.
 - SCADA security system password current settings, including personnel names.
 - Ancillary equipment status; e.g. security, fire detection, UPS).
 - Printing.
- (d) Indication of measured parameters shall be provided to three significant places or more.
- (e) All setpoints, such as temperature trip settings, flow trip settings, level settings for pump switch-on, etc., shall be indicated on mimic screens. It shall be possible, with password protection, to alter the set-points.
- (f) All points of inflection of measured parameters shall be recorded.
- (g) At least one colour printer (for graphs, mimics, etc.) and one line printer (for alarms) shall be provided.
- (h) An alarm condition which leads to the control system executing an equipment trip shall be logged and all subsequent alarms which occur as a result of the tripping action shall be logged as subordinate alarms. The condition which caused the trip shall be fully described with respect to the:
- Item of equipment.
 - Trip setpoint reached.
 - Description of parameter, i.e. flow, temperature, etc.
 - Time.
- (i) Alarm conditions which lead to the control system executing an equipment trip shall be provided with a suitable time delay to limit the number of tripping actions cause by electrical disturbances or similar occurrences. The time delay for each trip shall be decided in conjunction with the Engineer.

PSB1.55 CONTRACTOR'S DRAWINGS

The following requirements apply to the preparation of the drawings:

- (a) Drawings shall be prepared in accordance with the latest issue of SABS 0111 (or superseding document). The equivalent BS code of engineering drawing practice will also be acceptable.
- (b) Drawings shall be to A1 size.
- (c) Drawings shall be to scale, with both the scale and the drawing being large enough to clearly show all relevant components of the plant and equipment without misunderstanding.
- (d) Drawings shall be in black ink.
- (e) In addition to the usual plan and two side elevations, sufficient additional sections shall be included to clearly show the arrangement of all plant and equipment.
- (f) General arrangement and detail drawings shall be cross-referenced.
- (g) Items and components shall be systematically and clearly numbered, with consistency (same item numbers) between layout and detail drawings for the same plant or equipment.
- (h) Item lists shall be provided on the drawing or on a separate parts list.
- (i) Item descriptions shall include the material of construction, quantity and full identification information, including, as applicable, brand name, manufacturers reference number, model number, size, rating, source, duty, quantity, etc.

The Contractor shall prepare and correct drawings to satisfy the requirements of the Conditions of Contract and of this Specification to the satisfaction of the Engineer and shall incorporate reasonable changes required by the Engineer.

PSB1.56 TUITION**General**

The Tenderer shall price for tuition of operational and technical staff. Unless otherwise called for in the Detailed Specification, the Tenderer shall price for the on-Site personal tuition of operational staff members and engineering staff members.

The Contractor shall also provide all WMA staff involved with printed copies of the tuition material. Printed copies shall preferably also be included in the Manual.

Operational Staff Tuition

The Contractor shall provide the following tuition as applicable to the Contract:

- a) Start-up, shut-down and operating instruction for all operational modes for the Works shall be provided. This shall be comprehensive and shall include actions to be taken in the case of all alarm conditions and basic fault finding.

- b) A layout drawing of the installation, a process flow diagram, and a P&ID shall be provided for each Operator. The instructions described in (a) above shall also be provided in printed form for each Operator.
- c) If the specified control system is SCADA based, the tuition shall include instruction on the SCADA system.

Electrical Engineering Staff Tuition

The Contractor shall provide the following tuition as applicable to the Contract:

- a) Control system software instruction.
- b) Detailed overview of 11 kV protection and settings.
- c) Tuition on setting of 11 kV protections.
- d) Motor protection relay and settings.
- e) Overview of PLC programming for the purposes of making changes and re-loading programs if PLCs are replaced.
- f) Overview of SCADA system.

PSB1.57 OPERATING INSTRUCTIONS

Wall mounted operating instructions, if specified in the Detailed Specification, shall comply with the following:

- a) Start-up, shut-down and Operating instructions shall be provided. These shall be comprehensive and shall indicate actions to be taken in the case of all alarm conditions. These shall be written from the point of view of the plant operator.
- b) A layout drawing of the equipment installation, a process flow diagram, and a P&ID shall be provided.
- c) Instructions shall be framed (wooden frame, glass front, hardboard backing) and shall be attached to the wall in the control room using brass screws.

PSB1.58 INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Miscellaneous

The Manual shall comply with the following:

- a) A Manual for the complete Works is required.
- b) Two copies of the Manual shall be provided prior to commissioning of the Works. One copy is to be submitted for acceptance by the Engineer and will be returned to the Contractor. The second copy will be used by the operational staff on Site during commissioning. Unless otherwise specified, six copies of the final version of the Manual shall be provided prior to the end of the Trial Operation Period.
- c) The Manual shall be of a standard acceptable to the Engineer. At least one set shall contain original copies and this set shall be marked "Original". The other sets shall be marked "Copies 2 to 6".
- d) Binders shall have hard, plastic protected covers utilising four-ring, spring-clip holders. Sufficient binders shall be used to make each volume easy to use. One spare, empty binder shall be provided for every three used. A title label shall be affixed to the spine of all binders. This shall indicate contract number, title and location, Contractor's name and, where required, plant description, volume number and contents.
- e) Labelled separator sheets shall be provided between each section and sub-section and also wherever volume or complexity make this advisable.

- f) The Manual shall be in English, shall be easy to use, practically and neatly presented, clearly sectionalised, and titled, provided with a Contents List and shall be specifically applicable to the system as installed.
- g) Where standard equipment manuals are used in any sections, these shall be marked up to be unambiguously applicable to the equipment installed and marking up shall be done in a manner which will be transmitted to photocopies.
- h) All sections and sub-sections shall be numbered. Numbering of the Contents List shall be sequenced so that section numbering is unique.
- i) Drawings shall be to a scale which makes all details clear. Large drawings shall be held in plastic envelopes in the Manual. A4 and A3 drawings shall be bound directly. Drawings shall also be provided on CD in AutoCAD format.
- j) Where practical, each section shall form a separate volume.

The Manual shall be divided into sections and shall include the information described below.

Section 1 – General

The following shall be provided:

- a) Contents List for the complete Manual. This shall consist of:
 - an overall contents list.
 - a detailed contents list in front of each section and/or sub-section.
 - a comprehensive list of all drawings.
- The Contents Lists shall be structured so as not to be affected if volumes are added or subtracted from the Manual.
- b) Equipment List for all individual items of mechanical, electrical, instrumentation and control equipment. The Equipment List shall include the make, model, serial number, description, size, range, performance data, motor and drive details, supplier's name, address and phone numbers, all as applicable. The design duty, the position of each unit's installation and its purpose in the system shall be given. Additional information which shall be provided for instruments includes the tag number and setpoints. A schedule of corrosion protection systems used shall be provided for fabrications such as tanks, supporting structures, clarifier bridges, etc.
 - c) Cable schedule for power and instrumentation cables. This shall include the cable construction, conductor material, insulation, protection, voltage rating, start and finish points, route length, duty, load, voltage drop, no. of cores, core area, no. of cores used and gland size. For cable voltages above 400 Volts, the schedule shall also include the purchase details, specification, and date of manufacture.
 - d) Cable routes.
 - e) Drawing list of all Contractor's and Tender drawings.
 - f) The detailed specification, Section D of the Specification, may be included in this section.

Section 2 – Process, Operation and Control

The following shall be provided:

- a) Description of plant and process design and including all design parameters.
- b) A description of each system supported by drawings, process flow or circuit diagrams and explanatory sketches to assist operating staff.
- c) Description of control system, including control panels and SCADA system, as applicable and including controls, instruments, settings, indications, alarms, trips, etc. Functional Specification. List of protections, including description, sensor, operating limits, settings, etc.
- d) Straight forward, step by step, initial start-up instructions for commissioning. These shall include operating steps, precautions, settings, adjustments, observations, etc.
- e) Training manual including normal start up, adjustment, operating and shut down procedures for the system as installed and including settings, adjustments, observations, etc. The procedures shall highlight any safety precautions to be observed.
- f) Functional description and operation instructions of all electrical panels.
- g) An Instrument List giving a description of the duty as well as the serial number, normal operating reading, maximum or minimum permissible readings, set-points (activation, warning and trip), etc.
- h) Trouble-shooting guide, including symptoms, causes and solutions.
- i) Documents:
 - ✦ as-built system, layout and GA drawings.
 - ✦ plant circuit or flow diagrams
 - ✦ P&IDs, indicating equipment, piping, valves, instrumentation, and safety devices.
 - ✦ control panel layouts.
 - ✦ I/O list, program listing, loop and logic diagrams for each PLC, if applicable.
 - ✦ paper copies of SCADA mimics, if applicable.
 - ✦ system control diagram and logic sequence chart, as applicable.

Section 3 - Maintenance Schedules

The following shall be provided for all mechanical, electrical, instrumentation and control equipment:

- (a) A comprehensive lubrication schedule of recommended and initial lubricants, capacity, lubrication periods, etc., for all items.
- (b) A comprehensive maintenance schedule of routine maintenance by time period for the new installation and including information for individual items.
- (c) It is not required that the detail information in supplier's standard manuals is repeated here and cross-references will be acceptable on condition that the position of the supplier's manual in the contents list is given.

Section 4 - Mechanical Equipment

The following shall be provided for each item of mechanical equipment:

- (a) A copy of the information applicable to the item and appearing in the Equipment List.
- (b) A separate table containing the unit's nameplate information; or a photograph of the nameplate.
- (c) Technical and descriptive literature, including principle of operation and construction.
- (d) Installation instructions.
- (e) Detailed operating instructions.
- (f) Control and electrical details, including logic sequence, circuit diagrams and software, as applicable.
- (g) Full technical and maintenance information including instructions for assembly, disassembly, lubrication, adjustment, calibration, reconditioning, repair, etc.
- (h) A spares list giving the item number, part number, description, quantity, and materials. A list of recommended spares.
- (i) Factory and Site test results.
- (j) Corrosion protection systems used, coating supplier's data sheets and coating repair procedures.
- (k) Drawings:
 - performance curves.
 - layout drawings.
 - large scale, dimensioned, cross sectional and arrangement drawings of the item for assembly and spares recognition purposes, cross-referenced to the spares list.
 - dimensioned drawings of fabricated equipment.
 - circuit layout of any auxiliary systems.

Section 5 - Electrical Equipment

The following shall be provided for each item of electrical equipment:

- (a) A copy of the information applicable to the item and appearing in the Equipment List.
- (b) A separate table containing the unit's nameplate information; or a photograph of the nameplate.
- (c) Technical and descriptive literature, including principle of operation and construction.
- (d) Control and electrical details, including logic sequence, circuit diagrams and software, as applicable.
- (e) Installation instructions.
- (f) Detailed operating instructions.
- (g) Full technical and maintenance information including instructions for assembly, disassembly, lubrication, adjustment, calibration, reconditioning, repair, etc.

- (h) A spares list giving the item number, part number, description, quantity and materials. A list of recommended spares.
- (i) Factory and Site test results.
- (j) Drawings:
 - electrical reticulation.
 - equipment overall dimensions.
 - wiring diagrams.
 - switchboard layout drawings and SLDs.
 - electrical panel construction drawings.

Section 6 - Instrumentation Equipment

The following information shall be provided for each item of instrumentation equipment:

- (a) A copy of the information applicable to the item and appearing in the Equipment List.
- (b) A copy of the relevant information in the table of instrumentation in the sub-clause "Operation Section" and including all settings.
- (c) Installation instructions.
- (d) Descriptive and technical literature giving full details of performance, operation, calibration, setting, service, maintenance, and spares including suitable assembly drawings.
- (e) Technical and descriptive literature, including principle of operation and construction.
- (f) Control and electrical details, including logic sequence, circuit diagrams and software, as applicable.
- (g) Factory test results.
- (h) Full technical and maintenance information including instructions for assembly, disassembly, lubrication, adjustment, calibration, reconditioning, repair, etc.
- (i) Drawings:
 - ⌘ circuit diagrams of both instrumentation systems and individual instruments.
 - ⌘ overall dimension and installation drawings.

Section 7 - Control Equipment, Network and Software

The following shall be provided, as applicable to the Works:

- (a) A copy of the information applicable to PLCs, transmitters, HMIs, computers, etc. which appear in the Equipment List.
- (b) Cross-referenced listing of all I/O used.
- (c) Prints of SCADA mimic screens (all copies to be provided in colour).
- (d) An annotated program listing.
- (e) Drawings:
 - ⌘ copy of hardware diagnostic mimic.
 - ⌘ loop drawings showing field terminal numbers, marshalling terminal numbers and PLC rack/slot/terminal numbers.

Section 8 – Drawings

All drawings not filed elsewhere shall be filed in this section.

PSB1.59 INSTALLATION, OPERATION AND MAINTENANCE MANUAL

The contents of the Manual shall be generally as follows:

- 1 *GENERAL*
 - 1.1 *Contents List*
 - 1.2 *Overall Description of Works*
 - 1.3 *Equipment List*
 - 1.4 *Drawing List*
 - 1.5 *Cable Schedule*
- 2 *PROCESS, OPERATION AND CONTROL*
 - 2.1 *Description of Plant and Process*
 - 2.2 *Control System*
 - 2.3 *Protection System*
 - 2.4 *Commissioning*
 - 2.5 *Normal Operation*
 - 2.6 *Instrument List*
 - 2.7 *Troubleshooting*
- 3 *MAINTENANCE SCHEDULES*
 - 3.1 *Lubrication Schedule*
 - 3.2 *Maintenance Schedule*
- 4 *MECHANICAL EQUIPMENT*
 - 4.1 *(Item 1; e.g., "Chlorinators")*
 - 4.2 *(Item 2; e.g., "Pump")*
 - 4.3 *(etc.)*
- 5 *ELECTRICAL EQUIPMENT*
 - 5.1 *(Item 1; e.g., "Transformer")*
 - 5.2 *(Item 2; e.g., "MV Switchboard")*
 - 5.3 *(etc.)*
- 6 *INSTRUMENTATION EQUIPMENT*
 - 6.1 *(Item 1; e.g., "Turbidimeter")*
 - 6.2 *(Item 2; e.g., "Pressure Transducer")*
 - 6.3 *(etc.)*
- 7 *CONTROL EQUIPMENT, NETWORK AND SOFTWARE*
 - 7.1 *(Item 1; e.g., "PLC")*
 - 7.2 *(Item 2; e.g., "SCADA Software")*
 - 7.3 *(etc.)*
- 8 *DRAWINGS*

This contents list may be elaborated and/or repeated as required.

PSB1.60 STARTING, SITE TESTING AND COMMISSIONING OF PLANT

Before starting up any section of the Works, the Contractor shall make all necessary

checks to ensure that the installation has been correctly carried out, that all ducts, pipework, tanks, etc., are clean, that all equipment is correctly aligned, lubricated, and connected up, and is in all respects ready to start with safety. It shall be noted that all initial fill requirements such as lubricating oil shall be the responsibility and at the cost of the Contractor.

The Contractor shall arrange for the Engineer to be present at initial startup and also, if applicable, for the electrical and control instrumentation sub-contractors to be present.

The Contractor shall start up and test each section of the Works. These tests will be carried out to certify that the Works is operating in accordance with the requirements specified and must be witnessed by the Engineer. All necessary modifications and rectifications shall be carried out during this period.

Three copies of reports in writing on all tests shall be submitted by the Contractor within two weeks after the tests have been carried out.

When all tests have been completed to the satisfaction of the Engineer, the Works shall be commissioned. Unless the Engineer states otherwise, the complete plant, including all control functions and control systems shall be commissioned as a unit and the process performance requirements shall be achieved during normal operation. The Contractor shall train the operational staff in the starting, operating and stopping of the Works, and shall train the maintenance staff on the routine maintenance requirements.

PART B2 - PARTICULAR MECHANICAL SPECIFICATIONS

PSB2.1: General

PSB2.2: RBC Rotors and Motors

PSB2.3: Pumps and miscellaneous Steel Pipework

PSB2.4: Chlorine Handling and Dosing Equipment

PSB2.5: Miscellaneous

PSB 1 PARTICULAR MECHANICAL SPECIFICATIONS**PSB 2.1 GENERAL****PSB 2.1.1 GENERAL DESCRIPTION OF WORK**

This Contract covers the supply, delivery, erection, installation, testing, commissioning, and upholding during the period of Operation Service, of Mechanical equipment only to be incorporated in the refurbishment of Harper Wastewater Treatment Works and Pump station.

PSB 2.1.2 DESCRIPTION OF THE SITE AND ACCESS

The site is located on the site of the existing Harper Wastewater Treatment Works. The treatment site is accessible by an existing tar road.

PSB 2.1.3 SCOPE AND SUB-DIVISION OF CONTRACT

This Mechanical part of the Contract has been divided into sections as follows:

- PSB2.1: General
- PSB2.2: RBC Rotors and Motors
- PSB2.3: Pumps and miscellaneous Steel Pipework
- PSB2.4: Chlorine Handling and Dosing Equipment
- PSB2.5: Miscellaneous

The Scope of Works to be carried out under this Mechanical Part of the Contract is the supply, delivery, installation, and commissioning and maintaining during the Defects Liability Period of:

a) Rotating Biological Contactors

6 x RBC Rotors: Replacement of all rotors complete with axles and supports.
Replacement of gearboxes and motors on all 6 rotors

b) Humus Recycle Pump

1 x 1.1kW Submersible Recycle Pump

c) Chlorination

1 x 100L make-up and dosing tank
1 x Dosing pump with plastic piping
Sufficient bagged sodium hypochlorite to last 3 months.

PSB 2.1.4 FACTORIES, MACHINERY AND BUILDING WORKS ACT No. 22 OF 1941 (as amended) AND THE MACHINERY AND OCCUPATIONAL SAFETY ACT No. 6 OF 1983 (Republic of South Africa)

All items supplied and installed under this Contract shall meet the requirements of the above Acts, as amended from time to time, and meet all the requirements of the Government Inspector, and of all Laws, Bye Laws, Regulations, and requirements of Local and other Authorities having jurisdiction over this Contract.

PSB 2.1.5 STANDARD SPECIFICATIONS

Unless otherwise authorized, all plant and equipment and structures shall comply in every respect with the appropriate SANS or BSS Standard Specifications and Codes of Practices where applicable. Under all circumstances the latest edition of, or amendments to, the particular Standard Specification or Code of Practice shall apply.

PSB 2.1.6 ALTERATIONS, ERASURES OR ADDITIONS

No alterations, erasures, or additions of any kind whatsoever, shall be made by the Contractor, in, from, or to any of this Specification nor to any part of the Supplementary Specifications, Calculations and Schedule of Measurements

Rates and Prices, supplied by the Contractor, and should any such alterations, erasure or addition be made, the same will not be recognized by the Engineer.

PSB 2.1.7 PACKING

All materials shall be properly and securely packed and protected against all risk of damage by handling or corrosive influences on land or sea, and the material shall be delivered and kept on site in a perfect condition and free from damage. The Contractor shall take all risks of damage to plant and materials in transit.

PSB 2.1.8 FINISHED WORK

All plant and equipment shall be carefully fabricated and installed, tested for operation, and adjusted so that it functions properly. Any changes or adjustments required to obtain satisfactory operation shall be made by and at the expense of the Contractor. The finished work shall be to the full dimensions expressed or implied by the Contract Documents. Each trade shall do the necessary jobbing after other trades and upon completion shall make good its own particular class of work when this has been in any way affected or impaired by any other work.

PSB 2.1.9 PROVISION FOR COMPLETE PROCESSES AND DESIGN CRITERIA

Tenderers must include in their prices for all plant and equipment necessary for the proper and correct operation of each process. Full details must be given of all ancillary plant and equipment included in the offer such as pumping plant, heating equipment, electrical equipment, controls, recorders, chemical dosing, storage and mixing tanks and similarly necessary equipment.

PSB 2.1.10 COVER UP WORK

The Contractor is to provide for covering up and protecting part or parts of the work where required or as may be directed by the Engineer during wet or inclement weather or from the effects of the sun.

PSB 2.1.11 CLEAN UP AND RESTORE BUILDINGS AND STRUCTURES ON COMPLETION

Buildings, tanks, and other civil structures will be handed over to the Contractor in a clean, dry condition, and are to be handed back in a similar condition.

PSB 2.1.12 ERECTION AND CHECKING OF WORKS

As each part of the Contract works is installed and ready for testing, it shall be passed by the Engineer. Such passing shall in no way exonerate the Contractor from any of his guarantees and responsibilities.

PSB 2.1.13 STANDARD OF WORKMANSHIP

The attention of Tenderers is directed to the high standard of workmanship required in the design and installation of the plant to be supplied under this contract. All plant shall be installed accurately in its correct position as shown on the drawings, and fixed, grouted and permanently installed so as to operate as designed, without failure of the holding fixtures.

All installations shall be neatly finished off so that identical pieces of equipment are the same and any unnecessary damage done to building works shall be repaired at the Contractor's expense.

All bolts, including hold down bolts, shall be to correct length of thread protrude for each set or series of bolts. In any event, the length of thread protruding shall not exceed 5 times the thread pitch.

PSB 2.1.14 INTERFERENCE WITH EXISTING SERVICES

The Contractor shall carry out the contract works with the minimum interference with the existing services. Service pipes and cables, etc., in the vicinity of the new works shall receive special care. The Contractor will be held responsible for all delays and interference with services and claims arising there from. He shall bear the cost of repairing any damage to the same, due to negligence or miscalculation on his part.

PSB 2.1.15 PROTECTION

The Contractor shall be responsible for and make good all damage to the works and site, from any cause whatsoever, and shall reinstate in all respects at his own expense the works and site up to the date of the final performance of this Contract.

The Contractor shall case up or otherwise protect and cover up all works requiring the same, including the work of sub-contractors, and shall remove same and clean off on completion including soiling and other damage to finishes in building.

The Contractor shall keep the whole of such works throughout the currency of the contract, free and clear of water, sand, silt, mud or any obstruction whatsoever which may arise or come into any part thereof whether by reason of rains, floods, springs, surcharging or temporarily blocked storm water drains, or any other cause, and shall provide for all necessary temporary coverings, drains, piping, channels, permanent or temporary trenches, bailing, pumping and so forth, as may be necessary.

PSB 2.1.16 INSTALLATION AND ERECTION

The installation and erection of all equipment supplied under this contract shall be the responsibility of the Contractor. The cost of establishing on site, required guarantees, and lifting equipment shall be covered in the general rates. The Contractor shall be responsible for ensuring that any work carried out by his own staff or any sub-contractors working for him is to his satisfaction and that the equipment will meet all requirements of the Specification as well as in compliance with the provision of the Factories, Machinery and Building Works Act No. 22 of 1941 (as amended) and the machinery and Occupational Safety Act No 6 of 1983 (Republic of South Africa) and all of the statutory regulations applicable to the work envisaged.

The Contractor shall be responsible for proving all bolts, nuts and washers and steel supports such as columns and brackets and fixing them in position and the costs of fixing and providing support must be included in the tender price.

Before erection, the Contractor shall check all levels, dimensions or holes, supports, fixtures, pipes, and all other work.

The dimensions of all equipment must be checked by the Contractor after manufacture and on delivery. The plant shall not be erected until the above has been checked by the Contractor.

If the Contractor proceeds with installation of the equipment, it shall be taken that he has checked the critical dimensions and no claims for additional erection costs in respect of faulty dimensions will be admitted after this point.

PSB 2.2 ROTATING BIOLOGICAL CONTACTOR**PSB 2.2.1 SCOPE**

This section covers the removal and replacement of:

- *Six RBC rotors, each 4 m long with 2m diameter polyurethane disks and replacing it with new ones.*
- *Six gearboxes, one per rotor, each with 0.75kW motor.*

The equipment which has been removed shall be disposed of offsite.

PSB 2.3 HUMUS SLUDGE RECYCLE PUMP**PSB 2.3.1 SCOPE**

This section of the contract covers the supply, delivery, erection, installation, putting into satisfactory operation, testing, and upholding during the Period of Operation Service of an electrically driven submersible pump to recycle humus sludge from the sludge collection box next to the hums tank, to the Septic Tanks.

Reference	From	To	Effluent pumped	Total no of pumps	Number standby	Pump Rate per Pump (L/sec)	Static Head m	Total Head m	Pump Preferred
Humus Recycle	Humus Tank	Septic Tanks	Humus Sludge	1	0	4	2,2	2,7	HQ Pump VS.40H_0.42 110L

PSB 2.3.2 EXISTING PIPING AND SPECIALS

As this is an existing works, the existing exposed steel piping and specials on the delivery side of the pump need not be replaced, but piping shall be repainted (colours to be decided on site) while all other valves shall only be serviced.

A provisional sum shall be allowed for specials which, after attempting servicing, may have to be replaced.

PSB 2.3.3 TESTING

On completion of installation when putting into proper operation of the pumping installations, the Contractor will be required to make suitable arrangements for the testing of the plant and equipment supplied under this Contract, in the presence of the Engineer or his representative so as to determine whether they comply with the guaranteed figures submitted by the Contractor.

PSB 2.4 CHLORINATION**PSB 2.4.1 SCOPE**

This section of the Contract covers the supply, delivery, installation, putting into satisfaction operation, testing, and upholding the Period of Operation Service of chlorination equipment for the whole Works.

The scope of equipment required will be:

- A 100L sodium hypochlorite make up tank.
- A Grundfos (same as present pump) dosing pump dosing from the tank to the chlorine contact channels.

PSB 2.4.2 TYPE OF EQUIPMENT**PSB 2.4.2.1 Dosing rate**

The design and layout of the dosing system shall allow for a fixed effluent flow of 4L/sec.

The dosing equipment will be sized to dose up to 8mg/L at the 0.2ML/D average flow. This represents 0,12kg/hour.

PSB 2.4.2.2 Dosing and Dosing Equipment

Sodium hypochlorite shall be liquified manually by mixing it with tap water in the 100L tank. The Dosing pump shall then dose the liquified mixture into the chlorine contact channels at a fixed rate.

Sufficient bagged sodium hypochlorite shall be provided to last three months.

PLDW DEWATERING AND DESLUDGING – TENDER SPECIFICATIONS**PLDW SCOPE OF WORK**

The Contractor shall supply all labour, plant, materials, and equipment necessary for the dewatering and desludging of tanks, reactors, sumps, and pipelines as indicated on the drawings and instructed by the Engineer. The works include:

- Removal of liquid and sludge from structures
- Cleaning of tanks and chambers
- Transportation and disposal of sludge
- Handling and treatment of supernatant water
- Safe reinstatement of facilities to operational condition

PLDW 2. GENERAL REQUIREMENTS

All works shall comply with relevant **SANS standards** and environmental regulations. The Contractor shall submit a **method statement** detailing:

- Dewatering methodology
- Sludge handling and disposal procedures
- Environmental protection measures
- Health and Safety plan

Work shall be carried out **without interrupting plant operations**, unless otherwise approved.

PLDW 3. DEWATERING REQUIREMENTS

Dewatering shall be done using:

- Submersible pumps.
- Vacuum tankers “honey suckers”.
- Wellpoint systems (if groundwater control is required).

Pumped water shall:

- Be discharged to an **approved location**
- Not cause erosion, flooding, or contamination
- Be treated if required before discharge

The Contractor shall ensure:

- Continuous operation of pumps where necessary
- Standby equipment availability
- Proper management of seepage and inflow

PLDW 4. DESLUDGING REQUIREMENTS

Sludge removal shall include:

- Mechanical or manual removal of settled sludge

- Breaking up of hardened sludge deposits
- Removal of floating materials (scum, grease)

Equipment may include:

- Vacuum tankers
- Sludge pumps
- Mechanical scrapers

The Contractor shall:

- Prevent spillage during removal and transport
- Maintain hygienic working conditions
- Avoid damage to existing structures and equipment

PLDW 5. CLEANING OF STRUCTURES

After desludging, all structures shall be:

- Thoroughly cleaned using high-pressure water jets or approved methods
- Free of sludge residue, debris, and contaminants

Special care shall be taken to:

- Protect coatings and linings
- Avoid structural damage

PLDW 6. SLUDGE TRANSPORTATION AND DISPOSAL

Sludge shall be transported using licensed waste transporters.

Disposal shall be at an approved landfill or treatment facility in accordance with:

- Local municipal regulations
- Environmental legislation

The Contractor shall provide:

- Waste disposal certificates
- Proof of legal disposal

PLDW 7. ENVIRONMENTAL PROTECTION

The Contractor shall:

- Prevent contamination of soil, groundwater, and surface water
- Control odours and dust
- Implement spill prevention and response measures

No sludge or contaminated water shall be discharged indiscriminately.

PLDW 8. HEALTH AND SAFETY

All works shall comply with the Occupational Health and Safety Act. The Contractor shall:

- Provide PPE for all personnel
- Ensure safe entry into confined spaces
- Monitor hazardous gases (e.g., H₂S, methane)
- Provide ventilation where required.

A confined space entry permit system shall be implemented.

PLDW 9. MEASUREMENT AND PAYMENT

Measurement shall be based on:

- Volume of sludge removed (m³), or
- Lump sum per structure, as specified in the BOQ

Rates shall include:

- Labour, equipment, and materials
- Pumping and cleaning
- Transport and disposal
- All safety and environmental compliance costs

No additional payment will be made for:

- Standby time
- Minor inflows or seepage

PLDW 10. Completion Requirements

Upon completion:

- Structures shall be clean and ready for operation
- All equipment shall be reinstated and tested
- Site shall be left in a safe and tidy condition

PLL N PARTICULAR SPECIFICATIONS FOR GEOMEMBRANE LINING**PLL N 1 SCOPE OF WORK**

The Contractor shall supply, deliver, install, test, and commission a complete geomembrane lining system for ponds, tanks, or channels as indicated on the drawings. The works include surface preparation, supply of materials, installation, jointing, anchoring, and quality assurance testing.

PLL N 2 MATERIALS**PLL N 2.1 GEOMEMBRANE**

- The geomembrane shall be High-Density Polyethylene (HDPE) or approved equivalent.
- Minimum thickness: 1.5 mm (unless otherwise specified).
- The material shall comply with GRI GM13 for HDPE geomembranes.
- Properties shall include:
 - High chemical resistance (suitable for wastewater/sludge)
 - UV resistance
 - Low permeability
 - High tensile strength and elongation

PLL N 2.2 GEOTEXTILE PROTECTION LAYER

- Non-woven geotextile (minimum 200–300 g/m²)
- Used above and/or below the geomembrane for protection against puncture.

PLL N 3 SUBGRADE PREPARATION

- The subgrade shall be:
 - Smooth, firm, and free of sharp objects, stones, roots, or debris.
 - Compacted to at least 95% Mod AASHTO density.
- All irregularities shall be removed or corrected before lining installation.
- The Engineer must approve the subgrade prior to installation.

PLL N 4 INSTALLATION

Installation shall be carried out by experienced and certified installers. Panels shall be laid in a manner to minimize seams and wrinkles. Installation shall not be carried out under:

- High winds
- Rainfall
- Extreme temperatures

Seaming shall be done using:

- Double wedge fusion welding, or
- Extrusion welding (for repairs and details)

All seams shall be continuous and watertight.

The geomembrane shall be anchored in anchor trenches as per design drawings. Typical anchor trench dimensions shall be 500 mm deep × 500 mm wide (or as specified in the drawing).

PLL N 5 QUALITY CONTROL AND TESTING

All seams shall be tested using Air pressure testing (for double seams) and Vacuum box testing. Seam samples shall be taken at regular intervals (e.g., every 150 m). Tests shall include shear strength and peel strength. Manufacturer certificates shall be provided confirming compliance with GRI GM13.

PLLN 6 PROTECTION AND COVERING

The installed geomembrane shall be protected from damage during subsequent works. Where specified, cover layers (soil, concrete, or ballast) shall be placed carefully to avoid puncturing.

PLLN 7 MEASUREMENT AND PAYMENT

Measurement shall be in square meters (m²) of installed geomembrane lining. The rate shall include:

- Surface preparation
- Supply and installation of geomembrane
- Seaming and anchoring
- Testing and quality control
- All labour, equipment, and incidentals

PLLN 8 GUARANTEE

The geomembrane lining system shall carry a minimum 10-year warranty against defects in materials and workmanship.

PLM2 PARTICULAR SPECIFICATIONS FOR ELECTRICAL WORKS**PLM2.1 CONTRACTOR DESIGN AND OBLIGATIONS**

The Contractor shall be responsible for the workshop drawings and wiring diagrams required for the manufacturing and installation of motor control centres, buildings and instrumentation.

PLM2.2 QUALITY OF MATERIALS

Only materials of first-class quality shall be used and all materials shall be subject to the approval of the employer's agent prior to installation. Departmental specifications for various materials to be used on this contract such as department public works and infrastructure standard electrical specification (section A, B and C) are not attached but form part of this specification and available on the department website and from the employer's agent on request.

Wherever applicable the material is to comply with the relevant South African Bureau of Standards, department of public works and infrastructure electrical specifications which are available or to IEC Specifications, where no SANS specifications exist.

Materials wherever possible, must be of South African manufacture.

PLM2.3 TRAINING AND MAINTENANCE DURING DEFECT LIABILITY PERIOD

The Contractor shall inform the Engineer on the completion of the project and provide training to the person(s) responsible for the operation and maintenance of the project. The training shall be conducted for a period equivalent to 8 hours, starting with the basic information and getting into detail as time progresses. The training will be scattered into a minimum of 2 days.

Training shall not be conducted unless materials and planned procedure is approved by the Engineer and the client representative. The number of personnel to attend the training shall be determined by the Client and contractor to ensure they all have training material as may be required.

During the defect liability period, the Contractor shall be responsible for the complete maintenance of equipment and plant according to the suppliers/manufacturers' specifications. Maintenance of the installation shall mean the regular servicing, lubrication, repairing, cleaning and adjustment of the installation as recommended by the manufacturers as well as the free of charge replacement of any defective components during this period.

A suitably qualified and trained person shall routinely and regularly examine and test the installation once every 3 months and shall also perform all the necessary maintenance tasks to ensure smooth and faultless operation. A quarterly report shall be submitted to the Engineer.

The Contractor shall immediately, on the day of first call-out, attend to breakdown/emergency calls. In the event of non-performance by the Contractor in this respect, the employer shall be entitled to make such other arrangements as are necessary, the cost of which shall be for the Contractor's account or deductible from any outstanding retention monies.

A logbook shall be kept and all servicing and repairs shall be recorded in this logbook with meticulous care. The logbook shall at all times be put at the disposal of the Engineer. The Contractor shall issue the logbook with full record of all services and repairs to the employer after the defect liability period has expired.

PLM2.4 OPERATION AND MAINTENANCE MANUALS

Three (3) sets of comprehensive operating instructions and maintenance procedures shall be provided on completion of the commissioning of the installation

One draft copy shall be submitted for scrutiny PRIOR To any commissioning.

PLM2.5 FIRE EXTINGUISHERS

Portable fire extinguishers containing liquefiable gaseous halons for Class S, B, C and E fires shall be installed. Areas with a room floor area not exceeding 50m² shall be equipped with a 2.5kg unit and rooms bigger than 50m² shall be equipped with a 4kg unit and equivalent mass of smaller units. In structures where more than one room is incorporated, housing different hazardous points, each room shall be equipped with appropriate extinguishers, e.g. a generator room with a separate fuel store.

Portable extinguisher shall comply with SANS 0105. Fire extinguishers shall be installed near exits or along exit routes in conspicuous and unobstructed positions and marked with conspicuous signboards. The extinguisher must be so installed that the carrying handle is 1.25m above floor.

Extinguishers that are to be mounted outside and adjacent to the main entrance door shall be mounted with a suitable cupboard.

PLM2.6 PLANNING AND PROGRAMING

The Contractor shall provide and maintain a detail construction program indicating duration of all manufacturing processes, transportation, delivery and installation dates.

There are no constraints on the execution of the work. However, any disruption of the normal working of the plant must be planned and co-ordinated in conjunction with the Engineer and Client

PLM2.7 SEQUENCE OF WORK

The electrical works shall be coordinated with the mechanical and civil works to ensure smooth execution.

PLM2.8 OTHER CONTRACTORS ON SITE

Should other contractors be required on site coordination between the concerned parties would be essential and this should not interfere with the works under this contract in any significant way.

PLM2.9 ELECTRICAL SPECIFICATION**PLM2.9.1 MOTOR CONTROL CENTRE (MCC)**

The MCC is to be manufactured from 3CR12 with a minimum thickness of 1.5mm. The MCC is to be light orange with smooth white back plates, finished from baked enamel with dry fill thickness of at least 0.1mm. Immediately after cleaning all surfaces shall be covered by a rust inhibiting, tough unbroken metal-phosphate film and then thoroughly dried. The paint shall have an impact resistance of 5,65 J on cold-rolled steel plate and a scratch resistance of 2kg.

The MCC shall be IP 54 rated and shall be specifically sized for the equipment for which it is to house. The MCC shall be designed in such a way that adequate heat dissipation is accomplished in order to prevent any de-rating of equipment or premature tripping of circuit breakers or any other electrical devices.

PLM2.9.1.1 Variable Speed Drive (VSD)

All electrical motors motor shall started using variable speed, only the submersible pump motor shall start using direct online starter. Each variable speed drive shall be rated at the rating of the motor and

shall digital keypad and display screen with keys such as run, stop/reset, forward or reverse, hand, auto, and menu etc. It shall be designed to fit inside the MCC and shall have a built-in active front end rectifiers to reduce harmonics. It shall be rated at minimum input voltage of 230V phase to neutral and 400V phase to phase and shall have a minimum overload tolerance of 120% of rated current for at least 1 minutes every 5 minutes and a minimum 160% of rated current for 3 seconds during every 25 seconds.

PLM2.9.2 CONTROL PHILOSOPHY OF THE WATER TREATMENT MOTORS**PLM2.9.2.1 Modes of operation**

The equipment shall operate in three modes of operation 'AUTO', 'MAN' & 'OFF' and shall be

available via a 3- position selector switch on the control starter panel door.

With the selector switch selected in 'AUTO' the control shall be as follows:

The equipment will automatically flip flop, starting and stopping according to the start and stop conditions as stated above.

All fault and alarm conditions will need to be reset manually from the pump station when selected in 'AUTO'. With the selector switch selected in 'MAN' the control shall be as follows:

In the manual selected position, the pumps shall be started manually by means of separate start and stop push buttons for each pump.

Manual operation is not to be the normal mode of operation and is only to be used for testing and maintenance purposes, therefore the operation shall be manned at all times during such operation with skilled and trained operators.

With the selector switch selected in 'OFF' the control shall be as follows:

No control shall be possible and any previously running equipment shall stop. Pump & Motor Protection

The following pump and motor protection shall be available in the operational modes indicated in the table below:

TYPE OF PROTECTION	AUTO	MAN	OFF
Short circuit & overcurrent protection	x	x	
Over & under voltage	x	x	
Phase sequence & imbalance	x	x	
Low & high level (float switch)	x	x	
Motor high temp	x	x	
Phase angle / Under load Protection	x	x	

Any fault condition that occurs must be indicated by an illuminated indication light and prevent any further operation of the pump until the reset push button has been pressed. Only once the fault has been cleared and the reset button pressed should the indication light go off and normal operation allowed commencing. All protection and float control circuits must be wired failsafe.

PLM2.9.10 DE-COMMISSIONING OF THE EXISTING PANELS

The existing electrical equipment is to remain in service until the new MCC has been installed and commissioned for a trouble-free period of at least 1 week. Only once a trouble-free period of 1 week has been reported to the Engineer shall permission be granted to the contractor to

proceed with the de-commissioning and upgrading of the existing. Should this not be a viable solution a new plan shall be established and presented to engineer for approval. The newly established plan shall ensure that the Hospital has enough water all times.

PLM2.9.11 LIGHTNING PROTECTION

All equipment in the control MCC shall be adequately protected against lightning and lightning induced disturbances on the control and power cables. Suitable lightning suppressors, surge arrestors and circuit breakers shall be provided to suit the particular application.

PLM2.9.12 GENERAL ELECTRICAL REQUIREMENTS

The Contractor shall refurbish the general electrical installation on site including all small power outlets and luminaries.

PLM2.9.13 LOW VOLTAGE (L.V.) CABLES AND TRENCHES

Supply and install the following L.V. cables. The cables shall comply with the requirements of SANS 1507 as amended. The cables shall be of the PVC/PVC/SWA/PVC type.

PLM2.9.14 IDENTIFICATION OF CABLES

Cables shall be identified at all terminations by means of punched metallic bands or marked with labels or tags. (Refer also to SANS 10142). The use of PVC tape with punched characters is not acceptable. The identification numbers of cables shall be shown on "as built" drawings of the Installation.

PLM2.9.15 TESTING

Each cable shall be tested after installation in accordance SANS 1507 (up to 1 kV) and SANS 97 (up to 11 kV) as well as the requirements of the Local and Supply Authorities.

LV Cables shall be tested by means of a suitable megger at 1 kV and the insulation resistance shall be tabulated and certified.

The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The cost of testing shall have been included in the tender price.

The Contractor shall notify the Department/Engineer timeously so that a representative of the Department may witness the tests.

On completion of the tests on any cable, the Contractor shall without delay, submit three copies of the certified Test Reports to the Department/Engineer.

PLM2.9.16 NEW LUMINAIRES

Description/Specification	Typical Fitting
Surface mount 40W LED luminaire with 4000lm and dimensions of (LxWxH) 1270 x 86 x 90 mm shall consists of an injection-moulded, flame-retardant polycarbonate housing and prismatic diffuser. A powder coated white reflector and control gear tray upon which all electrical components shall be mounted and secured by means of multiple twist lock latches to secure the reflector to the housing. Silicon sponge seal shall be moulded into the housing to ensure an optimal seal between the housing and the prismatic diffuser. Two of the stainless-steel latches shall facilitate the hinging of the diffuser and ensure correct alignment when closing the diffuser. It shall be designed to operate LEDs of up to 65W. The luminaire shall come complete with constant current driver, 1.7 to 2.3kg weight, mains tolerance of $\pm 10\%$ at 230V voltage supply, line frequency of 50Hz, Class I electrical safety class, 10kV/10kA surge protection, power factor of ≥ 0.95, operating temperature of -30 to $+35^{\circ}\text{C}$, enclosure tightness of IP 65 and mechanical withstand impact of IK07.	
Surface mount 13W LED luminaire with 2000lm and dimensions of 280mm diameter shall have base and trim ring manufactured from of high pressure die-cast marine grade, the trim ring casting shall be mounted onto the base casting by means of stainless steel M5 Allen head screws located outside the lamp compartment. The base and trim shall be finished with epoxy powder coating. An opal non-discolouring high impact acrylic injection molded diffuser shall be used and shall offer excellent vandal resistance, be highly translucent and shall not discolour even when subjected to the harshest UV environments. A silicon sponge gasket shall be fitted into a special groove in the diffuser to prevent damage to the gasket during installation and to achieve the certified ingress protection rating of IP65, It shall be designed to operate LEDs of up to 13W. The luminaire shall come complete with 300mm supply lead, constant current driver, mains tolerance of $\pm 10\%$ at 230V voltage supply, line frequency of 50Hz, Class I electrical safety class, 10kV/10kA surge protection, power factor of ≥ 0.95, operating temperature of -20 to	

+35° C, and mechanical withstand impact of IK08.	
Wall mount (flood mounting) 55W 24LED luminaire with 7012lm and dimensions of (LxWxH) 3396mm x 249mm x 63mm shall have body manufactured from marine grade aluminium, high-impact polycarbonate protector and painted finish, housing shall be corrosion-resistant high-pressure die-cast and shall provide access to photometric engine and electronic assembly in case of upgrading or replacing components. The luminaire shall have certified ingress protection rating of IP66, It shall be designed to operate LEDs of up to 55W. The luminaire shall come complete with constant current driver, mains tolerance of $\pm 10\%$ at 230V voltage supply, line frequency of 50Hz, Class I electrical safety class, 10kV/10kA surge protection, power factor of ≥ 0.95 , operating temperature of -20 to +60° C, and mechanical withstand impact of IK10.	

PLM2.9.17 CONDUIT AND WIRING

Galvanised plain-end steel conduit shall be used for lighting and power installation, all conduit shall be chased into wall unless an agreement between the engineer and contractor has been reached to have it surface. All wiring shall be channelled through conduit throughout the installation and 2.5mm² single core stranded conductor shall be used for lighting and 4mm² shall be used for single phase socket-outlet points unless. Provisional quantities of conduit, wiring and small power outlets have been included in the bills of quantities. Instructions as to the final requirements will be issued during the construction stage. All items will be re-measurable.

PLM2.9.18 TELEMETRY

The Contractor will be responsible for the supply, installation and commissioning of a new telemetry system. The Telemetry units will be wall mounted on enclosures manufactured from 3CR12, with baked enamel finish. All Telemetry radios are to operate on the 433.05 - 434.79Mhz licence free bandwidth. All telemetry shall be 12 VDC operated with battery backup. A minimum standby time of 24 hours is required.

PLM2.9.18.1 TELEMETRY EQUIPMENT

PLM2.9.18.1.1 System Overview

The telemetry system supplied will be used for remote monitoring and control to various designated sites.

The system shall not only allow for units that accept direct I/O (e.g. digital, analogue, pulses) but also gateway units that allow direct interfacing to common industrial protocols (e.g. Modbus, Modbus Plus, Ethernet/IP, Profibus, DF1) commonly employed by various PLC vendors as well as third party equipment manufacturers.

It shall therefore be possible to have a combination of both wireless I/O and wireless gateways in a single telemetry system that can scale as the system requirements dictates. The system aims for easy setup and maintenance (by the supplier as well as end-user if necessary). The software to configure and maintain the radios shall be made freely available with this system. It is strongly advised that radio path testing is undertaken where uncertainty lies on the reliability of the radio signal strength. The radio telemetry system shall operate in the 430 – 450MHz range with a software- adjustable RF transmit power level of up to 5W.

PLM2.9.18.1.2 Principle of Operation

Radio transmissions must occur when an input signal changes (change-of-state). That is, when a digital (e.g. switch contact) input turns off or on, or when the value of an analogue input changes by a pre-configured amount (delta-change), a radio transmission should occur. There should also be regular update transmissions (configurable) to check the value of the input signals and to insure the integrity of the communications signal. The communications status shall be made available as an alarm output. In the event of a communications failure, it shall be possible to reset digital and analogue outputs to zero.

Input signals should be transmitted in a data frame which shall include the address of the transmitting module (and repeaters if used), the address of the destination module, and a CRC error check. The error check will be used to ensure that there is no corruption of the data frame during transmission. The same radio module shall have digipeating (digital repeating) capabilities as well. It shall also be possible to have peer-to-peer communications between modules – this means that wireless units can transmit directly to any other wireless unit, and can also transmit to multiple wireless units. There are no master units and no slaves and it shall be possible for all input signals to be transmitted to multiple destinations.

Each module should have handshaking capabilities over the air so that if transmitting module is suppose to receive an acknowledgment from the receiving module, and the transmitting module does not receive this acknowledgment, it should have retry capabilities. It must be possible to flag a communications failure via a digital output on the unit.

PLM2.9.18.1.3 General Specifications Power Supply:

The unit should incorporate an internal switched-mode power supply design that will accept an input voltage of 230V +/-10% tolerance supply. The unit should also have a built-in battery charger to allow for an uninterrupted power supply and internally automatically switch to 12V battery backup in the event of a power failure. On return of main supply, the unit must switch

back to mains operation, and charge the battery. It must also be possible to power the unit directly from a 12V battery at the battery terminals. The unit should have the ability to communicate its current state in real time to the RTU, giving the operator the ability to monitor and log voltages and currents as well as battery and AC state. The radios power circuit must have built-in intelligence and should be able to automatically alarm on loss of mains supply, loss of solar charging or low battery voltage and it should be possible to transmit these alarm signals to remote modules as digital output signals.

PLM2.9.18.1.4 Inputs / Outputs Description:

See the technical specifications table below to a description of the I/O capabilities of the radio modules.

PLM2.9.18.1.4.1 RS232 Port:

The serial port must be a 9 pin DB9 female and should provide a connection to a terminal or to a PC for configuration and testing. The port should not be used for radio data communications except in the case of wireless gateways where it could be used for interfacing to a host device such as a PLC.

PLM2.9.18.1.4.2 RS485 Port:

All telemetry modules will have I/O expansion capability via the RS485 port in the event that outstations I/O count needs to be expanded. The units must be expandable with up to 31 remote I/O units on the RS485 bus and mounting distances of up to 1200m from the radio should be achievable. The expansion I/O should consist of several options that include Digital, Analogue and Pulse input / output variations.

PLM2.9.18.5 Software Configuration:

The units should be easy to configure via standard Windows-based software. Programming the units can be done via a straight serial cable to the RS232 serial port. It must also be possible to extract the software configuration from the module.

The configuration software should be project-based and a single project file shall be used for the complete telemetry installation. There shall be password protection facilities for the project file to prevent unauthorized use. There software shall log and store data as required by the client for future use or reference.

PLM2.9.18.6 Diagnostics and Testing:

The unit should provide diagnostic and test functions by connecting a PC terminal to the module. It should be possible to test both I/O and communication functions. The unit will include a radio strength measurement, which provides an indication of background noise as well as received radio strength. This feature shall allow radio paths to be tested without any additional specialized test equipment. In the case of wireless Gateways, it should be possible to read and write to the actual units data registers for testing and diagnostic purposes.

Summary of Minimal Technical Specifications for Radio Telemetry Equipment. Remote Terminal Unit

Item	Minimum Specification
Communication	Data Radios, Cell SMS, Cell GPRS, RS232/485 and Ethernet etc
Features	Real-time I/O device, Intelligent Data Logger, Remote time stamping of event and logged data, Configurable and programmable from the Picasso Configuration Toolbox, modular and easily expandable, EMI Protection, Programmable with PLC Languages, Industrial standard high speed processor, On-Board 1Meg-Word Flash and Gig-Word non volatile RAM, On-Board Real-time clock and watch-dog timer , On-Board LED's indicating the Digital Input and Digital Output Status , Communication Orchestrator, Build to ISO 9000 Standards, 24 I/O's on the main processor board, DIN,8 AIN,8DOT,connects to interface modules such as I/O lightning protection units, galvanic isolation units for AIN's and 10A Interposing relay modules.
Analog Inputs (AIN)	8 Inputs, 12 Bit Resolution, 0.1 % Accuracy, Single ended, Additional AIN on expansion modules,
Digital Inputs (DIN)	8 Inputs, with LED status display, Opto-Isolated, 5 kV isolation and Additional DIN on expansion modules to accommodate all I/Os
Digital Outputs (DOT)	8 Outputs with LED status display, Open Collector, 250mA sinking per channel and additional DOT on expansion modules
Other Specifications	Voltage: 9 to 17Volts DC,120mA power consumption,2 x RS232 ports (300 to 57600 bps) RJ45(EIA-561 Compatible)
Data Reporting	Data shall be capable of being reported to any SCADA on the communication network. It shall be capable of being configured to send text messages to mobile cell phone users to report alarms

Digital inputs Surge Protector

Item	Minimum Specification
Features	Digital input lightning protection, No isolation available on the module.
Supply Voltage DC	Minimum 9V, maximum 15V and standard 12V
Physical Dimension	61mm x 42mm x 80mm (LxWxH)
Connection Sockets	14-Way Ribbon to the RTU or I/O Modules, 2 x 8 way termination connectors, 4 Way Power Supply 12V+, Ground.
Protection	10kA per channel and maximum input voltage 30Vdc
Channel (I/O)	Four channels

Power Supply

Item	Minimum Specification
DC supply	13.8V (tunable), max 4.3A (split between DC output and battery charge)
AC supply	Input: 90~264VAC, 47~63Hz
Battery supply	Battery charge: max 1.5A
Battery	Low Maintenance Battery 12Volt 18Ah
Rated Power	60W
Protection	Short circuit, overload and over-voltage protection, Battery low, battery polarity protection

Data Radio

Item	Minimum Specification
Transmission Power	2W
Working Frequency	433MHz, options 402-470MHz
Power Consumption	DC5V Power, receiving current <50mA, transmitting current <1.5A/2W (<1A/1W); Sleeping current <1mA.
Receiver Sensitivity	-112dBm
Working Temperature	-40°C~+85°C
Output/ Input Interface	RS 232, RS 485 and TTL
Power control Circuit Structure	One sleeping model, awoken from hardware Radio adopts chip integration, the conversion time for transceiver should be short less than 20ms, all indications consistency and better performance
High Anti-Interference and Low BER (Bit error Rate)	Based on the GFSK modulation mode, it shall adopts the efficient communication protocol. The actual bit error rate shall be $10^{-5} \sim 10^{-6}$ when channel bit error rate is 10^{-2} .

PLM2.9.18.7 Technical Competency

The supplier of the telemetry system must have experience with the radios being supplied and should either have undergone basic training or provide an authorized letter from the local agency indicating that they are able to offer sufficient technical support on the telemetry system.

PLM2.9.18.8 Service and Maintenance

The type of telemetry system deployed should ensure that in the event of the end user not getting satisfactory service from the supplier, they are able to seek assistance and technical support from an alternate supplier. The radio configuration software and all future revisions of it should be freely available to the end-user.

PLM2.9.18.9 Warranty

The radio telemetry modules used must ensure long-term reliable operation. A limited lifetime warranty from the manufacturer should be included as standard on all radio telemetry modules supplied.

PLM2.9.19 SCADA (SUPERVISORY CONTROL AND DATA ACQUISITION) SYSTEM

SCADA system shall provide supervisory control, monitoring and management of waste water system, by acquiring and analysing the data from these remote stations. It shall gather the real-time data from the stations, presents the data on various HMIs, records and logs the data on SCADA database management.

Radio telemetry shall gather data from other stations to the main station and the data shall be transferred from main station to the SCADA system via fibre, however the system shall be capable of gathering data from any other station during communication breakdown.

The system shall be so designed to allow addition of future stations which shall be added and form part of the entire system at later stage.

SCADA system shall store received data which shall also be used for trending, alarming, reporting and archiving, this system shall be capable of sending an alarm via sms to the relevant stakeholders in the event of unattended alarm.

The supply and installation of the system shall come complete with the software, ADSL, correctly sized computer to cater for current installation and wastewater stations which shall be added at a later stage and any other accessories which are required to supply a complete operational system.

The system shall have as a minimum, an operating system of 64-bit windows 8.1 Professional, i7 processor, 8 GB RAM and 40inch commercial type computer screen.

PLRA PARTICULAR SPECIFICATIONS FOR REMOVAL OF ASBESTOS SHEETS**PLRA1 REMOVAL OF EXISTING ASBESTOS**

The removal of asbestos shall be carried out by a certified entity, registered in accordance with Occupational Health and Safety Act, 1993 – Asbestos Regulations 2001 and all necessary precautions must be taken when working with disposing of asbestos cement products and the disposal of waste water resulting from cleaning operations, etc.

Asbestos in all forms/building elements that is accordance with aforementioned regulation and a certificate issued by the entity as contemplated in the above, shall be provided per block for the removal thereof, where the term block shall in this context refer to any single, free standing building structure, regardless of size or purpose

Corresponding disposal certificates shall be issued by the facility at which the asbestos is disposed of, with said facility to, prior to the disposal of any asbestos material provide satisfactory proof that the facility is duly registered and fully compliant in terms of the act, to

receive the asbestos material.

Under no circumstances is the Contractor nor any of his duly authorised representatives to sell and/ or give away asbestos material to any member/s of the school community, the community in general or the public at large.

Should this be found to be occurring, the Contractor will be held responsible contractually and may further be prosecuted criminally. The cost for complying with the above, and all requirements of regulation as reflected above is to be priced for in terms for removal of asbestos material. No further claims in this regard will therefore be entertained.

PLRA1.1 MEASUREMENT AND PAYMENT

Tendered rate shall include removal and disposal of asbestos products and the associated structures as described in section PLRA1. The unit of measurement in m².

PLSS1.70 PARTICULAR SPECIFICATIONS FOR ROOFING SHEETS AND SIDE CLADDING

PLSS1.71 MATERIALS FOR ROOF COVERING AND SIDE CLADDING

The following description applies for the roof covering to be installed on new roof structures and also for side cladding:

- Roof sheeting to be Concealed Fix interlocking KLIP-LOK 700", 0,58mm thick heavy industrial Z275 spelter galvanised steel sheeting with Chromadek, ColorPlus, Colourbond or Globalcoat finish to one side and Grey other side and accessories, fixed to steel purlins using SL 700 approved clips and fasteners.
- Loading to be considered with installation and fixing must be in accordance with manufacturer's recommendations and specifications.

PLSS1.72 MEASUREMENT AND PAYMENT

The tendered rate shall include supply and installation of the roof covering including all the fittings and screws as described in section PLSR1.1. The unit of measurement in m².

PLSS1.80 PARTICULAR SPECIFICATIONS FOR MANUFACTURE OF ROOF STEEL STRUCTURE

PLSS1.81 MANUFACTURE OF ROOF STEEL STRUCTURE

The description of the structural steel work for the new roof steel structures is as follows;

Structural steelwork welded in built up trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete in trusses and purlins, beams etc.

PLSS1.82 MEASUREMENT AND PAYMENT

The tendered rate shall include fabrication, supply and installation of the steel roof structures as described in section PLSS1. The fabrication to be done in accordance with fabrication drawings as approved by the engineer. The unit of measurement in m².

PARTICULAR SPECIFICATION FOR REPAIRS OF CONCRETE WORKS

PLRC1 REPAIR OF CONCRETE STRUCTURES (SPALLING)

PLRC1.1 REPAIR OF SPALLING ON CONCRETE SURFACES

The following procedure will be followed when repairing concrete with spalled surfaces.

- Square cut and remove spalled concrete by mechanical means. All delaminated, weak, damaged and deteriorated concrete to be removed to expose sound concrete
- Clean substrate and exposed reinforcement by high pressure water jetting.
- Concrete shall be free from dust, loose material, or any surface contamination.
- The concrete substrate must be sound and of sufficient compressive strength, min. 20MPa with a minimum pull off strength of 1.5 MPa.
- Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed and reinforcement cleaned to SA 2 in accordance with ISO 8501-1
- Pre wet concrete before application of bonding liquid or repair mortars
- Repair spalled concrete polymer modified, fibre reinforced, low shrinkage structural repair mortar with corrosion inhibitor

PLRC1.1.1 MEASUREMENT AND PAYMENT

The rate shall include all the repair works for spalled concrete as described above in PLRC 1.1. Units of measurements are in m².

PLRC 1.2 REPAIR OF CONCRETE STRUCTURES LINING

The following procedure to be followed for the relining of the existing concrete structures;

- The existing and repaired substrate to be prepared by suitable mechanical preparation techniques, such as high-water pressure or grit blasting to remove all previous coatings.
- Nonimpact/vibrating cleaning methods are preferred.

- Apply 2 coats of a fibre-reinforced mortar, with very low elastic modulus, cement modified with particle size selected aggregates and adequate additives for the waterproofing and protection of concrete.
- Maximum recommended is at least 4 mm, applied in 2 layers.

PLRC1.2.1 MEASUREMENT AND PAYMENT

The rate shall include all the repair works for lining of concrete channels as described above in PLRC 1.2. Units of measurements are sum.

PLRC 1.3 REPAIR OF CONCRETE STRUCTURES (JOINTS SEALING)

The repairs to the existing isolation joints will be done as follows;

- Remove sealant and clean existing joints
- Seal joint with a one part, moisture curing, elastic joint sealant with high mechanical resistance (Movement capability of 35% (ASTM C 920))

PSF: PARTICULAR SPECIFICATION: SOCIAL FACILITATION

PSF1. Scope

This specification covers the requirements for social facilitation services to ensure effective communication, participation, and cooperation between the Employer, Contractor, community structures, and stakeholders. The aim is to minimise conflict, ensure transparency, and promote local socio-economic development in line with project objectives.

PSF. Objectives

The social facilitator shall:

- Act as an independent link between the Contractor, Employer, and community.
- Facilitate the recruitment and management of local labour in accordance with project requirements.
- Support the implementation of the subcontracting and SMME development plan.
- Assist in resolving community-related disputes and grievances.
- Promote equitable participation of targeted groups (women, youth, persons with disabilities).
- Ensure that project benefits are communicated and understood by the local community.

PSF3. Duties of the Social Facilitator

The facilitator shall be responsible for:

- Conducting introductory community meetings at project commencement.
- Establishing and/or supporting Project Steering Committees (PSCs).
- Preparing and maintaining a Stakeholder Engagement Plan.
- Coordinating the selection of local labourers and subcontractors transparently.
- Monitoring compliance with labour targets, subcontracting quotas, and training programmes.
- Managing and reporting on community grievances and disputes.
- Submitting monthly reports to the Employer's Representative covering labour usage, subcontractor participation, and social issues.

PSF4. Deliverables

The following deliverables are required:

- Inception report (within 14 days of appointment).
- Stakeholder engagement plan.
- Records of community meetings and attendance registers.
- Monthly progress and compliance reports.
- Final close-out report on community participation and outcomes.

PSF 5. Measurement and Payment

Social facilitation shall be paid monthly as time-related item under a provisional sum in the bill of quantities. Payment shall be made for proven costs only, subject to submission of invoices, records, attendance registers, and approved reports. Contractor's percentage for charges (as tendered under "Percentage for Charges on Provisional Sums") shall apply. No additional claims will be entertained outside the Provisional Sum.

PSSF5.1 Social Facilitation (Provisional Sum) Prov. Sum.

PSSF5.2 Overhead costs, charges and profit on item %

VHEMBE DISTRICT MUNICIPALITY**LIMPOPO PROVINCE****REFURBISHMENT OF HARPER WWTW AND PUMP STATION****C 3.7 HEALTH AND SAFETY SPECIFICATIONS****C3.7.1 HEALTH AND SAFETY REQUIREMENTS AND PROCEDURES****(a) Construction Regulations, 2014**

The Contractor shall be required to comply with the Occupational Health and Safety Act, 1993: Construction Regulations, 2003 (the regulations) as promulgated in Government Gazette No 25207 and Regulation Gazette No 7721 of 18 July 2003. (A copy of the Construction Regulations is included as an Annexure in this Volume). Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

The proposed type of work, materials to be used and potential hazards likely to be encountered on this Contract are detailed in the Project Specifications, Bill of Quantities and Drawings, as well as in the Employers' health and safety specifications (regulation 4(1)) of the Construction Regulations 2003, which are included in this section.

The Contractor shall in terms of regulation 5(1) provide a comprehensive health and safety plan detailing his proposed compliance with the regulations, for approval by the Employer.

The Contractor shall at all times be responsible for full compliance with the approved plan as well as the Construction Regulations and no extension of time will be considered for delays due to non-compliance with the above-mentioned plan or regulations.

A payment item is/Payment items are included in the Schedule of Quantities to cover the Contractor's cost for compliance with the OHS Act and the above-mentioned regulations.

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III. INTRODUCTION AND BACKGROUND

a. Background to the Health and Safety Specifications

The Construction Regulations (February 2014) places the onus on Vhembe District Municipality to prepare coherent health & safety specifications, highlighting risks not successfully eliminated during design. The Vhembe District Municipality also has the opportunity to set the tone and standard of occupational health & safety on the construction site.

b. 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 principle 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

c. 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.

d. 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:

- i) safety considerations affecting the site of the project and its environment;
- ii) health and safety aspects of the associated structures and equipment;
- iii) required submissions on health and safety matters from the Principal Contractor (and Sub Contractor);
- iv) 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.

"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 Vhembe District 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
- b) The construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or bulk water pipeline 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 Vhembe District Municipality's health and safety specifications;

"Health and Safety Specification" –means a site, activity or project specific document prepared by the Vhembe District Municipality pertaining to all health and safety requirements related to construction work;

"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 Vhembe District 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.

e. 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

g) OCCUPATIONAL HEALTH & SAFETY MANAGEMENT

2.1 ROLES

Vhembe District Municipality / Agent

- i. Prepare a baseline risk assessment and issue a health and safety specification to the Principal Contractor, Designer and include the specification in tender documentation.
- ii. The Vhembe District Municipality or the appointed Vhembe District 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.
- iii. The Vhembe District Municipality or the appointed Vhembe District Municipality Agent shall discuss, negotiate and approve the contents of the specified project health and safety plan submitted by the Principal and Sub Contractor.
 - iv. The Vhembe District 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.
 - v. In the event of design changes the Vhembe District Municipality or the appointed Agent on his behalf will ensure that enough resources will be provided to implement the work safely.
 - vi. The Vhembe District 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:
 - a) ***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;***
 - b) ***have failed to implement or maintain their health and safety plan;***
 - c) ***have executed construction work which is not in accordance with their health and safety plan;***
 - d) ***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 of him/them being employed or legitimately on the site of the works or in its vicinity.***

Designer

- j) Must take into account the health and safety specifications of the Vhembe District Municipality.
- k) Before the tender process, the designer must make available a report to the Vhembe District Municipality about:
 - o All the relevant health and safety information about the design of the relevant structure that might affect the pricing of the construction work.
 - o The geotechnical –science aspects, where appropriate.
 - o The loading that the structure is design to withstand.
- 2.4 Inform the Vhembe District Municipality in writing of any known or anticipated dangers or hazards related to the project.
- 2.5 Make available all relevant information required for the safe execution of the work upon being designed or when the design is subsequently altered.
- 2.6 During the design take into account the hazards relating to any subsequent maintenance to be performed with the minimum risk.
- 2.7 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.

h) 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 Vhembe District 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, Vhembe District 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 than employees.

3.2 The Extent of the works:

- l) Establishment of Contractor's camp site.
- m) The excavation of the trenches and installation of the pipes will be done conventionally due to the depth of trenches.
- n) Installation of reticulation Networks in Maepa and Ratau.

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.

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 list of hazards identified as well as potentially hazardous tasks;
- ✦ The risks which may result based on the list of hazards and tasks;
- ✦ 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);
- ✦ 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 Vhembe District Municipality i.e. at audits.

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 Vhembe District 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 Vhembe District 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.

(j) 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 Vhembe District 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).

(k) Offences and Penalties

Penalties may be imposed on the Principal Contractor and Contractors for ongoing non-compliance with the provisions of the Vhembe District 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, Vhembe District Municipality Standards. The decision of the safety Agent will be final.

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;

The Principal Contractor shall hand over a consolidated health and safety file to the Vhembe District 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 Vhembe District 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 Vhembe District 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 Vhembe District 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)

1.1.1 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.

3.5.4 Contractors' Coherent Health & Safety Plans [Construction Regulations 2014]

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.

3.5.5 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:

3.5.6 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:

PSB 2.7.1 Management structure and responsibilities

PSB 2.7.2 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

PSB 2.7.3 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 Vhembe District 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.

PSB 2.7.4 Site specific rules and procedures.

3.6 Vhembe District Municipality identified Hazards and Potentially Hazardous Situations

PSB 2.2 Existing services

PSB 2.3 Interface with the public

PSB 2.4 Hazardous chemical such as solvents, cleaning agents, cement, fuels, oils, epoxies, etc.

PSB 2.5 Site security and access control issues

PSB 2.6 Relocation and protection of existing services

PSB 2.7 Finishing trades

3.6.1 Unforeseeable Hazards

The Principal Contractor must immediately notify Contractors as well as the Vhembe District 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.

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 Vhembe District 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 Vhembe District 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:

- D2** List of key competent personnel;
- D3** Details of emergency services;
- D4** Actions or steps to be taken in the event of the specific types of emergencies;
- D5** Evacuation procedures: including routes and exits to be available on a drawing.
- D6** 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.
- D7** The Principal Contractor must advise the Vhembe District Municipality in writing forthwith, of any emergency situations, together with a record of action taken/action to be taken.
- D8** A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and made available to site personnel.
- D9** 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 Vhembe District 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).

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 Vhembe District Municipality /Vhembe District Municipality's Agent and the Construction Health and Safety Agent. Additional health and safety requirements will then be applicable.

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.

3.7.13 Construction Health & Safety Officer

A full-time construction safety officer (in terms of Construction Regulation 8) will be required on this project. **The construction health and safety officer must be registered with SACPCMP.** 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;
- 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 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 Vhembe District Municipality and fenced off as per the Vhembe District 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.

3.8.3 Fire Extinguishers and Fire Fighting Equipment

The Principal Contractor and relevant Contractors shall provide adequate, regularly serviced fire fighting 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.

3.9 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;

- Inspecting equipment regularly (every 3 months) and keeping records of these inspections ;
- Providing appropriate fire fighting 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 Vhembe District 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 Vhembe District 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.

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.

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.

Ergonomics is the study of how workers relate to their workstations. We advise the Principal Contractor and Contractors to take this into 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 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.

3.10.5 COVID-19

Documents that need to be updated

Document control will be a critical path to ensure that all employees know the exact risks and mitigation factors around the COVID 19 virus.

- Baseline risk assessment shall be written on COVID 19 to ensure all the risks are covered and discussed to the employees
- Health and safety policy would need to be changed to address the COVID 19 pandemic
- All safe work procedures shall cover COVID 19
- COVID 19 guideline or procedure shall be drawn up and available in the safety file and discussed to all employees. This procedure will explain how the contractor will ensure that the virus does not spread during construction.
- A guideline on what the process will be if an employee or a visitor is showing symptoms of the COVID 19 virus

- COVID 19 Toolbox talks shall be held with all employees to explain to the employees what the COVID 19 virus is
- Applicable Checklist & register should be in place to ensure that all the measures that is stipulated in the Client OHS Spec, Baseline Risk assessment, COVID procedure and contractor OHS Plan
- Sign in register will need to be available at every site entrance where the employee or site security can write down the temperature of the employee or Visitor
- All Health and safety related policies will need to be revised to ensure that COVID 19 is covered and explained in all of them in the applicable manner
- COVID 19 manager shall be appointed on site. This employee shall be on site full-time.

Hand sanitation points

Hand sanitation points will need to be placed at strategic places as well as the high risk area. The first place where sanitation station shall be placed is at all site entrances. High risk areas will be identified by the following:

- Areas where employees are in frequent and/or close contact (i.e. within 1,5 Meter of people)

The high risk areas will have additional sanitation stations, all employees shall wear mask or face shield when working closer than 1, 5 Meter from the nearest employee. Employees will be trained to wash hands more frequently or to use sanitizer more frequently.

The hand sanitizer that will be used shall have more than 70% of Ethyl alcohol. This needs to be ensured by the safety office on site as well as a Material Safety Data Sheet (MSDS) available close by for confirmation of the 70%. The hazardous chemical register shall be available in the flammable store. This register shall also include the hand sanitizer.

Hand washing posters shall be available at all hand washing stations to ensure that all employees know what the correct way is of washing your hands to cover all the areas. Informational posters about COVID 19 shall also be visible at these areas to ensure that employees know how the virus spreads and how to prevent spreading. The sanitisation stations will need to be cleaned on a regular basis.

Cleaning & disinfecting

All work surfaces need to be cleaned and disinfected on a regular basis. The chemical that will be used to clean the surfaces must have a minimum of 70% Ethyl Alcohol and the MSDS for that specific sanitizer must be available in the safety file under the MSDS's section. Plant, site offices & construction sites shall be decontaminated before the start of the site. The contractor that decontaminated the site shall issue a certificate to explain it has been done and explain what chemicals was used.

Offices

- All offices must have a biochemical hazardous bin with a medical waste bag that can be sealed
- The offices need to be cleaned on a regular bases
- If disposable gloves is being used they must be discarded in the medical waste bin.
- Only employees that is working in the office will be allowed in the offices
- All visitors must arrange with office personnel if they have an appointment with one of the office employees to move outside and have the appointment outside or in a well-ventilated area and if possible keep social distancing distance (1,5 Meter)
- Cleaners must focus on cleaning the following areas: desks, printers, door handles, kettles, microwaves & office equipment (cabinets, staplers, punchers) etc.
- No utensils shall be shared
- All employees shall sanitise their hands before and after using building plans Ablution Facilities
- All ablution facilities shall have a washing station or a sanitation station.
- Sufficient paper towels shall be available to dry off hands after sanitizing
- All ablution facilities must have a biochemical hazardous bin, with a medical waste bag that can be sealed
- Paper towels shall be discarded into the medical waste bin provided at the ablution facilities
- Ablution facilities must be cleaned on a more regular basis to ensure a clean surface at all

- times
- Chemical toilets ratio is reduced to 1-10 employees and flush toilets ratio is reduced 1-15 employees
- Cleaners must focus on the most touch areas when cleaning ablution facilities (toilet handles, door handles, taps, basins surfaces, toilet seats etc.)

Eating areas

The eating areas in construction is a high risk due to the fact that the employees under normal circumstances would have sit within 1, 5 Meter of each other.

- Eating areas will need to make bigger to accommodate all employees at once but still implement social distancing of 1, 5 Meter at least.
- All eating areas must have a biochemical hazardous bin, with a medical waste bag that can be sealed
- All Servite that was used or paper towels that was used to dry hands after using the sanitation station must be discarded in the hazardous bin.
- All eating areas shall have a washing station or a sanitation station
- Lunch breaks should be staggered between contractors / employees to ensure that during lunch the social distancing 1, 5 Meter can still be implemented.
- All chairs, Table tops and drinking water taps need to be cleaned after each lunch break
- Notice board shall be placed at the eating area to ensure that all employees see all posters and notices
- Clean drinking water need to be supplied to all employees at the eating area Waste management

The waste management on site will be a critical path and will need to be monitored. The PPE and cleaning material that will be discarded will be seen as medical (biological hazardous) waste. This will need to be separated from normal waste, all medical waste bins will need to have a waste bag that can seal and need to be removed by a registered service provider. Hazardous bins shall be foot operated to ensure employees do not touch the lid of the hazardous bin.

Paper towels

Paper towels shall be supplied to by the contractor at all sanitation stations and washing stations for employees to dry their hands. These towel papers will be discarded in the medical waste bins. The contractor shall ensure that sufficient paper towels is in storage for a fast and effective replacements

PPE

All disposable PPE shall be discarded in these medical waste bins. Disposable PPE will be the following: dust masks, surgical masks etc.

Disinfectants

The sanitizers that will be available throughout the site if finished and not refilled will be discarded as medical waste. The contractor must ensure that sufficient stock of hand sanitizer and soap is available in the storeroom. This chemicals and soap shall be recorded as it is booked out of the storeroom.

Wastewater

The water that will be used at the hand washing points will need be stored in a container with a lid. This infected water will then need to be treated before the water can be discarded in a normal municipal sewage system.

Biological hazardous waste bin

The hazardous waste bins that will be placed all over site will need to be a different colour from the normal waste bin. This hazardous waste bins will need the appropriate signage's as displayed below as well as a sealable bag inside. This is an example of the sign that needs to be visible on all hazardous waste bins on site:

The hazardous waste bin does not have a specific size that will be required, but the contractor will need to monitor the waste and accordingly let the registered service provider come and remove the waste. The waste can only be dumped at a Class 1 dumping site or be incinerated. The registered service provider will provide a certificate that it has been discarded at the class 1 dumping site or incinerated. Hazardous bins shall be foot operated to ensure employees do not touch the lid of the hazardous bin.

Personal Protective Equipment (PPE)

COVID 19 be prevented from spreading using the correct PPE. The COVID 19 virus is spread by small droplets that can enter the body at the face through the nose, mouth and the eyes. This is the critical areas that must be protected at all cost to prevent the employees from getting the feared COVID 19 virus.

The disposable PPE will be treated as biological hazardous waste as explained above in waste management

The Contractor shall supply all employees with 2 cloth masks (1 to wear, 1 to wash). The cloth masks will be checked every morning at the entrance of the gate to ensure that employees are washing the cloth masks. This is an example of a cloth mask:

If the employees are working in a high risk area, the contractor will need to have a look at alternative measures to protect the employee's eyes as well as mouth and nose area. Face shields is a perfect example of an alternative way to protect our workers. There is different types of face shields on the market, from loose face shields with a strap to face shield and hard hat combination. Below is an example of these alternative equipment that will need to be in place in high risk areas when possible:

Employees will only be required to wear hand gloves when the task will require it (will be stipulated in the risk assessment). When for example the employee will do grinding work and the face shield will not last then the employee will be required to wear goggles and a normal dust mask.

Accommodation

When the contractor provides accommodation to the employees on site the following shall be in place:

- The quantity of employees must be looked at that is accommodated on site
- The restrictions on the number of employees using the same ablution facilities
- Cutlery & utensils shall not be shared between employees
- Social distancing between employees (at least 1,5 Meter) when in sleeping quarters and in cooking facilities.
- The employees shall practice good personal hygiene and shall sanitise areas that on a regular basis is used by all employees
- Employees shall not share any personal belongings with each other for example: clothes & towels

Transportation

The transportation of employees shall be monitored by the site safety officer as well as site management. Transportation will be arranged that all employees at all times implement the social distance of at least 1, 5 Meter from each other.

Employee using transportation as well as drivers will at all times wear mask to prevent the spread of the virus. Employees shall sanitize their hands before using transportation and after using transportation. Transporting employees in big quantities must at all times be prevented if possible. All transport shall be disinfected before and after use. If employees drive with personal transport, sufficient parking must be made available

i) 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.

ANNEXURE A

PRIMARY HEALTH AND SAFETY COMPLIANCE

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 onsite
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 onsite
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	Vhembe District 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	Construction regulations	Together with H & S Plan

HSS = health & safety specifications

OHS Act = occupational health & safety Act

CR = construction regulations

COIDA = compensation for occupational injuries and diseases Act

ANNEXURE B

ASSIGNMENT OF PRINCIPAL CONTRACTOR'S AND CONTRACTORS' RESPONSIBLE PERSONS

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).

Itemno.	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 Superviseand be responsible for health & safety related issues on site. The person isappointed 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)	Section 19	H&S reps, site supervisors / foreman andthe 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 on site.
B7	Risk assessment co-ordinator	CR9	A competent person to co-ordinate thedrafting / reviewing / distribution of riskassessments on behalf of the principalcontractor. The same applies to contractors. NQF Level 5
B8	Fall protection plan co-ordinator	CR10	A competent person to co-ordinate thedrafting / reviewing / distribution of Fall Protection Plan. The same applies tocontractors. NQF Level 4
B9	Emergency plan co-ordinator	Contractor Needs to be in line with service station ERP	A competent person to co-ordinate the drafting / reviewing / distribution of the site emergency procedures / evacuationplan. 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 liaise 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.
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 & mobileplant 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(6)	A competent person to fulfill the functionsas set out in these HSS

ANNEXURE D

GENERAL COMPLIANCE REQUIREMENTS

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 Vhembe District 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	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	Monthly	<u>Report covering:</u> a) Incidents / injuries and investigations b) Non conformances by employees & Contractors – reports c) Internal H&S audit reports	

C8	Audits on contractors	Monthly	<u>Report covering:</u> 3. H&S File / Plan 4. WCA status 5. Appointment letters 6. Section 37(2) agreements 7. Risk assessment & safe work procedures 8. Physical site inspection 9. Any other contractor specific requirements	
C9	Emergency procedures	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> (a) Excavations (b) Portable electrical tools (c) Formwork & support work (d) Explosive powered tools	
C13	General Inspections	Daily	(a) Scaffolding (b) Temporary Electrical Installations	
C14	General Inspections	Monthly	(e) Fire fighting equipment (f) Ladders	
C15	General Inspections	Monthly	(g) Lifting tackle (h) Oxy-acetylene cutting & welding sets (i) Fall prevention and arrest equipment	
C16	General Inspections	6-Monthly	(j) Lifting machines	
C17	Load tests / performance tests	Annually / once erected, before use	(k) 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.	

ANNEXURE D

OCCUPATIONAL HEALTH & SAFETY – HEALTH & SAFETY COSTS TO BE INCLUDED IN THE PRINCIPAL CONTRACTOR'S / CONTRACTORS' PRICE

In terms of the Construction Regulations (2014), it is the Vhembe District 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 Vhembe District 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
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	COID ACT Training
4.9	Scaffold Erector and Inspector Training

ITEM	DESCRIPTION
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 PlanDeveloper.
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 flammablestores.

ANNEXURE E

The Occupational health and Safety File must consist out of the following documentation:

INDEX

1	Appointment Letter from Vhembe District 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/Copy of ID'S and Personal Information
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 Covid – 19 Management 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

ANNEXURE F**OCCUPATIONAL HEALTH AND SAFETY ACT, 1993****(Regulation 4 of the Construction Regulations.****2014)NOTIFICATION OF CONSTRUCTION WORK**

(a) (a) Name and postal address of principal contractor:

(a) Name and tel. No of principal contractor's contact person:

(b) Principal contractor's compensation registration number:

(c) (a) Name and postal address of Vhembe District Municipality :

(a) Name and tel. No of Vhembe District Municipality's contact person or agent:

(d) (a) Name and postal address of designer(s) for the project:

(a) Name and tel. No of designer(s) contact person:

(e) Name and telephone number of principal contractor's construction supervisor on site appointed in terms of regulation 8(1).

(f) Name/s of principal contractor's sub-ordinate supervisors on site appointed in terms of regulation 8(2).

(g) Exact physical address of the construction site or site office:

- _____
- (h) Nature of the construction work
- _____
- _____
- (i) Expected commencement date: _____
- (j) Expected completion date: _____
- (k) Estimated maximum number of persons on the construction site.
- Total: _____ Male: _____ Female: _____
- (l) Planned number of contractors on the construction site accountable to principal
- Contractor: _____
- (m) Name(s) of contractors already selected.
- _____
- _____
- _____

Principal Contractor

Date

Vhembe District Municipality's Agent (where applicable)

Date

Vhembe District Municipality

Date

- i) 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**

VHEMBE DISTRICT MUNICIPALITY**LIMPOPO PROVINCE****REFURBISHMENT OF HARPER WWTW AND PUMP STATION****C3.8 REFERENCES TO THE SCOPE OF WORKS IN TERMS OF THE ENVIRONMENTAL MANAGEMENT PLAN****1. INTRODUCTION**

The EMP will address the environmental impacts during the design, construction and operational phases of a project. Due regard must be given to environmental protection during the entire road project. In order to achieve this a number of environmental specifications/recommendations are made. These are aimed at ensuring that the Contractor maintains adequate control over the project in order to:

Minimise the extent of impact during construction,
Ensure appropriate restoration of areas affected by construction.
Prevent long term environmental degradation.

The Contractor must be made aware of the environmental obligations that are stipulated in this document, and declares himself/herself to be conversant of all relevant environmental legislation. The Contractor should also be aware that the Engineer will monitor the implementation of the procedures.

2. POLICY STATEMENT

The construction will be to the best management practices as identified to minimize the environmental impact of activities associated with the development.

3. OBJECTIVES OF THE EMP

The EMP has the following goals:

Identifying those construction activities that may have a detrimental impact on the environment;
Detailing the mitigation measures that will need to be taken, and the procedures for their implementation;
Establishing the reporting system to be undertaken during the construction.

The EMP also serves to highlight specific requirements that will be monitored during the development and should the environmental impacts not have been satisfactory prevented or mitigated; corrective action will have to be taken. The document should, therefore, be seen as a guideline that will assist in minimising the potential environmental impact of activities.

4. DESIGNATED ENVIRONMENTAL OFFICER

For the purpose of the EMP, a nominated representative of the Contractor should be the designated environmental officer for the project. The nominated representative of the Contractor will therefore be responsible for ensuring that the provisions of the EMP are complied with. The Engineer will be responsible for issuing instructions to the Contractor where environmental considerations call for action to be taken. The environmental officer will submit monthly reports to the Engineer on site who will verify the information.

j) LEGAL REQUIREMENTS

Under normal circumstances and EMP would be the end result or the final stage in the EIA procedure. However, a working agreement was negotiated between the National Department of Environmental Affairs and Tourism (DEAT) and the Vhembe District Municipality Metropolitan Municipality.

The agreement stipulates the project types the Vhembe District Municipality Metropolitan Municipality need to submit to DEAT for approval and those project types the Vhembe District Municipality Metropolitan Municipality do not need to submit for approval. For those actions that do not need approval, the Vhembe District Municipality Metropolitan Municipality undertook to compile generic EMP's to assist to minimising degradation to the area. The following project types fall in this non-approval category: periodic maintenance, special maintenance, rehabilitation and specific upgrades.

6. MITIGATION MEASURES

In setting mitigation measures, the practical implications of executing these measures must be borne in mind. With early planning, both the cost and the impacts can be minimised.

6.1 Establishment of site offices

6.1.1 Site plan

The Contractor shall provide the Engineer on site with a plan detailing the layout of site offices facilities, such as chemical toilets, areas for stockpiling of material, storage of hazardous materials and provision of containers. The site offices should not be sited in close proximity to steep areas as this will increase soil erosion. Preferred locations would be flat areas along the route. If the route traverses water courses, streams and rivers, it is recommended that the site, and in particular the ablution facilities, aggregate stockpiles and hazardous material stockpiles are located as far away as possible from any water course as possible.

The site plan shall be submitted before the site hand over meeting. Read with Standard Specifications for Municipal Civil Engineering Works: Section 001 and 002.

i. Vegetation

The vegetation surrounding the site offices is to be left as intact as possible and vegetation planted at the site should be indigenous. Only trees directly affected by the works and such others as may be indicated by the Engineer in writing may be sawn off/removed.

The project specification for the rehabilitation of the grass cover shall be strictly adhered to. Any proclaimed weed or alien invader plant shall be cleared by hand before seeding. Read with Specifications: 104 – Landscaping and grassing.

6.1.3 Rehabilitation

The site offices will require rehabilitation at the end of the Contract. All construction material, including concrete slabs and braai areas are to be removed from the site on completion of the Contract. Read with Specifications Sections 001, 002 and 104.

6.1.4 Water for human consumption

Water for human consumption must be tested and treated in accordance with recommendations.

6.2 Sewage treatment

Adequate toilet facilities are to be provided. Use of the veld for this purpose shall not, under any circumstances, be allowed. The Contractor shall be entirely responsible for enforcing their use and for maintaining such latrines in a clean, orderly and sanitary condition to the satisfaction of the Engineer. Latrines shall be positioned within walking distance from wherever employees are employed on the works.

Save and effective sewage treatment will require one of the following sewage handling methods: septic tanks and soak away, dry composting toilets such as “enviro loos”, or the use of chemical toilets which are supplied and maintained by a Sub-Contract. The type of sewage treatment will depend on the geology of the area selected, the duration of the Contract and proximity (availability) of providers of chemical toilets is to be done in consultation with the Site Engineer.

6.3 Waste management

Waste management and waste minimisation must be implemented at the outset of the Contract.

6.3.1 Litter

No littering by construction workers are allowed. During the construction period, the facilities shall be maintained in a neat and tidy condition and the site is to be kept free of litter. Read with Specifications Sections 001 and 002.

6.3.2 Removal of solid waste

Solid waste is to be stored in an appointed area for collection and disposal. A refuse control system must be established for the collection and removal of refuse to the satisfaction of the Engineer. Disposal of solid waste will be in a Department of Water and Sanitation (DWS) licensed landfill site.

6.3.3 Hazardous waste

Hazardous waste such as bitumen, tar, oils, etc. shall be disposed of in a Department of Water Affairs and Forestry approved landfill site. Special care must be taken when using tar products such as tar prime or pre-coating fluid to avoid water-soluble phenols from entering the ground or contaminating water.

6.4 Soil management

6.4.1 Topsoil

The Contract provides for the stripping and stockpiling of topsoil from the site for later reuse. Topsoil is considered to be of a minimum thickness of ± 300 mm of the natural soil, including all the vegetation and organic matter. The areas to be cleared of topsoil shall include the storage areas. Weeds appearing on the stockpiled topsoil shall be removed by hand before seeding. Soils contaminated by hazardous substances shall be disposed of in an approved Department of Water Affairs and Forestry waste disposal site.

6.4.2 Borrow material

The Contractor's attention is drawn to the requirements set forth by the Department of Mineral and Energy Affairs in terms of the submission of EMPR's for establishment, operation and rehabilitation of borrow pits and quarries. The cost of complying with the requirements shall be deemed to be included in existing rates in the schedule of quantities. Read with the Specification Section 203.

6.5 Discovery of archaeological sites, artifacts or graves

6.5.1 Archaeological site

If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately. The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the Engineer of such discovery. The National Monuments Council must be contacted who will appoint an archaeological consultant. Work may only resume once clearance is given in writing by the archaeologist. Read with General Conditions of Contract.

6.5.2 Graves

If a grave on site is uncovered, work in the immediate vicinity must be stopped and an undertaker as well as the National Monuments Council should be contacted. The undertaker will place advertisements in the newspapers concerning the grave. He will also provide for the relocation of bones, should it be necessary. Read with General Conditions of Contract.

6.6 Stockpiled material

The Contractor shall so plan his activities that materials excavated from borrow pits and cuttings, in so far as possible, can be transported direct to and placed at the point where it is to be used. However, should temporary stockpiling become necessary, the areas for the stockpiling of excavated and imported material must be indicated and demarcated on the site plan and approved in writing by the engineer.

The area chosen shall be devoid of indigenous trees and shrubs. Care shall be taken to preserve all vegetation in the immediate area of these temporary stockpiles. After the stockpiled material has been removed, the site shall be reinstated as closely as possible to its original condition. All areas affected by stockpiling shall be landscaped, top soiled and grassed to the Employer's Agent's approval and at the Contractor's cost.

Material milled out of the existing road surface that is temporarily stockpiled within the road reserve shall:

- be stockpiled so as to be as inconspicuous as possible
- be prevented from contaminating water courses,
- be cleared of weeds.

In all cases, the areas for stockpiling and disposal of construction rubble shall be approved by the Engineer before such operation commences.

Read with Series 2: Earthworks – Section 203.

6.7 Fuel, diesel and other hazardous materials

6.7.1 Hazardous materials

All hazardous materials i.e., bitumen binders shall be stored in an appointed area that is fenced and has restricted entry. Storage of bituminous products shall only take place using suitable containers to the approval of the Engineer.

Under no circumstances shall the spoiling of bituminous products on the site, over embankments, in borrow pits or any burying, be allowed. Unused or rejected bituminous products shall be taken to the supplier's production plant. No spillage of bituminous products shall be allowed on site. Affected areas shall be promptly reinstated to the satisfaction of the Engineer.

6.7.2 Fuel

Should any fuel storage tank be required on site, the Contractor shall ensure that he has complied with the necessary legal requirements for the erection of such tanks. Leakage must be avoided. The fuel and diesel must be stored in a bunded area with adequate containment (at least 1,5 times the volume of the fuel) for potential spills and leaks.

6.7.3 Oil, grease

Oil, grease and cleaning materials from the maintenance of vehicles and machinery shall be collected in a sump and sent back to the supplier or, otherwise disposed of at a registered site.

6.7.4 Cooking oil

The Contractor should ensure that sufficient fuel is available for heating and cooking purposes should this be necessary.

6.7.5 Spillages

Streams, rivers and dams must be protected from direct or indirect spillage of pollutants such as refuse, garbage, cement, concrete, sewage, chemicals, fuels, oils, aggregate, tailings, wash water, organic materials and bituminous products. In the event of a spillage, prompt action must be taken by competent instances to clear the affected area.

6.8 General considerations

Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a designated register and the response noted with the date and action taken. This record must be submitted with the monthly reports.

Any avoidable non-compliance with the above-mentioned measures may be considered sufficient ground for withholding payment of part or all amounts to be paid for the said item.

k) MEASUREMENT AND PAYMENT

The Contractor shall not be separately reimbursed or compensated in respect of his compliance with the provisions of this part of the Scope of Works. All costs so incurred shall, save and except to the extent provided for the schedule of quantities under SECTION 001: GENERAL REQUIREMENTS AND CHARGES, be deemed to be included in the rates tendered for the various items of work listed in the schedule of quantities.

TABLE 1 SUMMARY OF MITIGATION MEASURES

<i>ENVIRONMENTAL COMPONENT</i>	<i>ACTIVITY</i>	<i>MITIGATION</i>	<i>RELEVANT SECTION IN SPECIFICATIONS</i>
<i>Establishment of site offices</i>	<i>Siting of offices</i>	<i>Preferred areas would be flat areas along the route. Avoid steep areas as soil erosion could increase. Avoid water courses</i>	<i>001 002.02.01</i>

ENVIRONMENTAL COMPONENT	ACTIVITY	MITIGATION	RELEVANT SECTION IN SPECIFICATIONS
	<i>Site Plan</i>	<i>Contractor will provide engineer detail of layout of site facilities within two weeks of moving to the site i.e. chemical toilets, the demarcation of areas for stockpiling of materials, storage of hazardous materials and the provision of containers. The offices shall be fenced. The site plan will be submitted before the site hand over meeting.</i>	001 002
<i>Site rehabilitation</i>	<i>Cleanup</i>	<i>All construction material is to be removed from the site on completion of the Contract.</i>	001 002 104
<i>Vegetation</i>	<i>On site</i>	<i>Vegetation planted on the site should be indigenous. Only trees directly affected by works as indicated in writing by Engineer, shall be sawn off/removed</i>	104
	<i>Weeds</i>	<i>Clearance of weeds must be done by hand before seeding.</i>	104
	<i>Grass cover</i>	<i>The grass cover surrounding the construction site is to be left as intact as possible or restored to its original condition.</i>	104
<i>Water</i>	<i>Available for human consumption</i>	<i>Water for human consumption must be tested and treated in accordance with recommendations.</i>	
<i>Soil management</i>	<i>Topsoil</i>	<i>The topsoil ($\pm$ 300 mm) of any excavation shall be removed and stockpiled separately from underlying material in an appointment area</i>	203 104
	<i>Borrow material</i>	<i>EMPR's for borrow pits to be submitted to the Department of Mineral and Energy Affairs for approval</i>	201 203
<i>Archaeological & Cultural sites</i>	<i>Discover of archaeological sites of artefacts</i>	<i>If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately and an archaeological consultant must be contacted. Work may only resume once clearance is given in writing by the archaeologist.</i>	GCC 2015 3 rd Edition

ENVIRONMENTAL COMPONENT	ACTIVITY	MITIGATION	RELEVANT SECTION IN SPECIFICATIONS
Graves	Discovery of graves	If a grave on site is uncovered, work in the immediate vicinity must be stopped and an undertaker should be contacted	GCC 2015 3 rd Edition
Waste management	Solid & Construction waste	Solid waste is to be stored in an appointment area for collection and disposal. Disposal of waste will be in a DWAF licensed landfill, and no waste may be burnt on site.	
	Litter	The site is to be kept free of litter	001
Sewage treatment	Toilet facilities	Adequate toilet facilities are to be provided, and the siting of chemical toilets is to be done in consultation with the site engineer. Use of the veld for this purpose shall not be allowed.	001 002
Fuel, diesel & hazardous materials	Hazardous Materials	All hazardous materials i.e. bitumen binders will be stored in an appointed area that is fenced and has restricted entry. No spoiling of bituminous products on site, over embankments, in borrow pits or any burning. No spillage of bituminous products shall be allowed on site.	
	Fuels	All fuel tanks will be stored in an appointed area. Leakage will be avoided.	
	Cooking fuel	The Contractor should ensure that sufficient fuel is available for heating and cooking purposes should this be necessary.	
	Oil, grease	Oil, grease and cleaning materials from maintenance of vehicles shall be collected in a sump and sent back to supplier.	
	Spillages	Streams, rivers or dams must be protected against spillages of pollutants mentioned in 6.7 (e). In the event of a spillage, prompt action must be taken to clear the affected area.	
General considerations	Lines of authority	A nominated representative of the Contractor will be the designated environmental officer for the site.	RELEVANT SECTION IN SPECIFICATIONS

<i>ENVIRONMENTAL COMPONENT</i>	<i>ACTIVITY</i>	<i>MITIGATION</i>	<i>RELEVANT SECTION IN SPECIFICATIONS</i>
	<i>Reports</i>	<i>The environmental officer will submit monthly reports to the Engineer who will verify the information</i>	
	<i>Complaints</i>	<i>Complaints received regarding activities on the construction site pertaining to the environment should be recorded in a designated register, and the response noted with the date and action taken. This record must be submitted with the monthly report</i>	

VHEMBE DISTRICT MUNICIPALITY

LIMPOPO PROVINCE

REFURBISHMENT OF HARPER WWTW AND PUMP STATION

C4 Site Information

C4.1 LOCALITY PLAN

VHEMBE DISTRICT MUNICIPALITY

LIMPOPO PROVINCE

REFURBISHMENT OF HARPER WWTW AND PUMP STATION

C4 Site Information

C4.2 TENDER DRAWINGS

LIST OF DRAWINGS

DRAWING NO.	DESCRIPTION	SHEET NO.
25007-03-H-00	LIST OF DRAWINGS	1-1
25007-03-H-01	NAME BOARD	1-1
25007-03-H-02	GENERAL LAYOUT	1-2
25007-03-H-03	INLET WORKS	1-1
25007-03-H-04	CHLORINE DOSAGE SYSTEM	1-1
25007-03-H-05	PUMP STATION	1-1
25007-03-H-06	STAFF ACCOMMODATION	1-1
25007-03-H-07	OFFICE BULDING	1-1
25007-03-H-08	GUARD HOUSE	1-1
25007-03-H-09	SECURITY FENCE	1-1

0	03/2026	FOR TENDER		F.M	
No	DATE	REVISION	CONSULT	DIR	

NOTES	

DESIGNED BY	RISUNA_BANDI
CHECKED BY	JUDITH_MAGAYA
DRAWN BY	RISUNA_BANDI
CHECKED BY	MATOME_LEDWABA
APPROVED BY	ALEX_CHIUSWA
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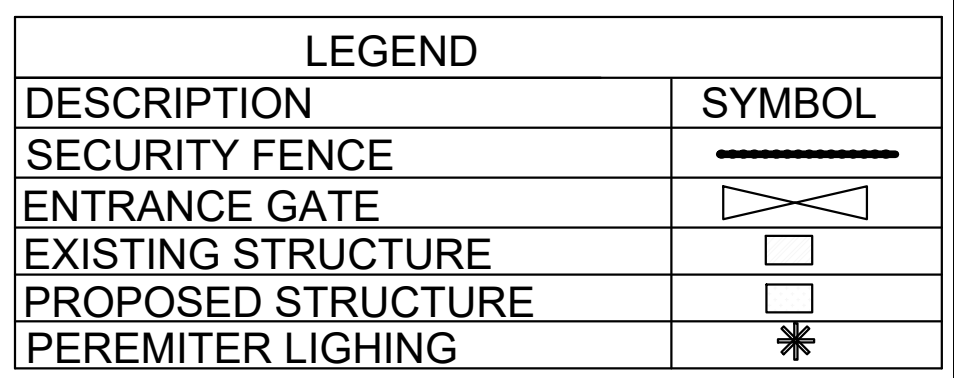
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EMAIL: admin@hwaeng.co.za

PROJECT NAME	REFURBISHMENT OF HARPER WASTEWATER TREATMENT PLANT
DRAWING TITLE	DRAWING LIST

DRAWING No. 25007-03-H-00
ORIGINAL SHEET SIZE A1
CONTRACT No. VDM/TECH/ 17/03/2026/03

SCALE NTS
REVISION No. 0
SHEET No. SHEET 1 OF 1



DRAWING No. 25007-03-H-02	SCALE 1:200
ORIGINAL SHEET SIZE A1	REVISION No. 0
CONTRACT No. VDM/TECH/17/03/2026/03	SHEET No. SHEET 1 of 2



LEGEND	
DESCRIPTION	SYMBOL
SECURITY FENCE	
ENTRANCE GATE	
EXISTING STRUCTURE	
PROPOSED STRUCTURE	
PERIMETER LIGHTING	

[illegible][illegible]

STAMP	
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DESIGNED BY	RISUNA BANDI
CHECKED BY	JUDITH MAGAYA
DRAWN BY	RISUNA BANDI
CHECKED BY	MATOME LEDWABA
APPROVED BY	
SIGNATURE	

CLIENT



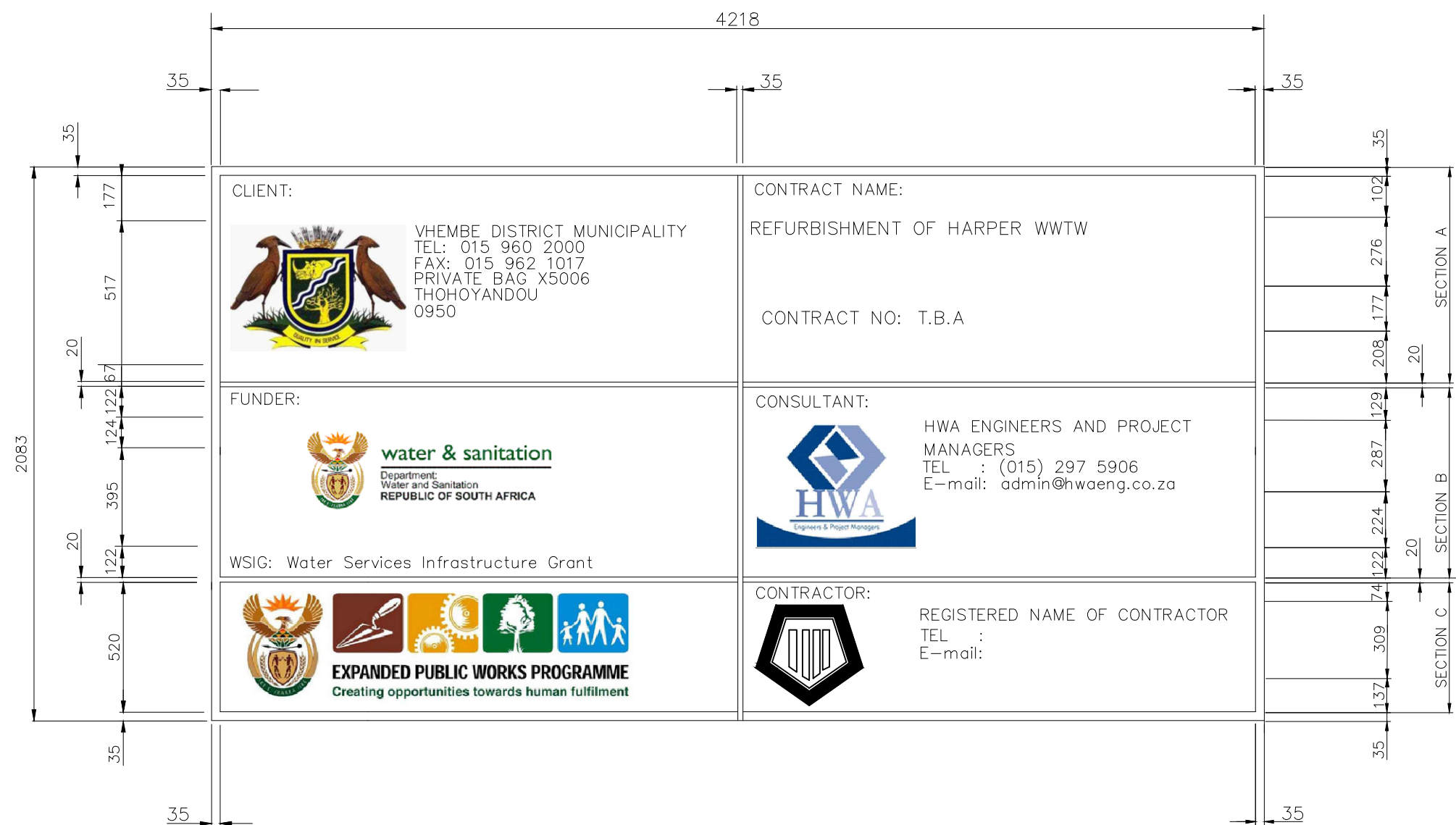
VHEMBE DISTRICT MUNICIPALITY
PRIVATE BAG X5006 TEL: 015 960 2000
THOHOYANDOU FAX: 015 962 1017
0950

CONSULTANT	
	
127 MARSHAL STREET POLOKWANE 0699	TEL: 015 297 5906 FAX: 086 246 0744 EMAIL: admin@hwaeng.co.za

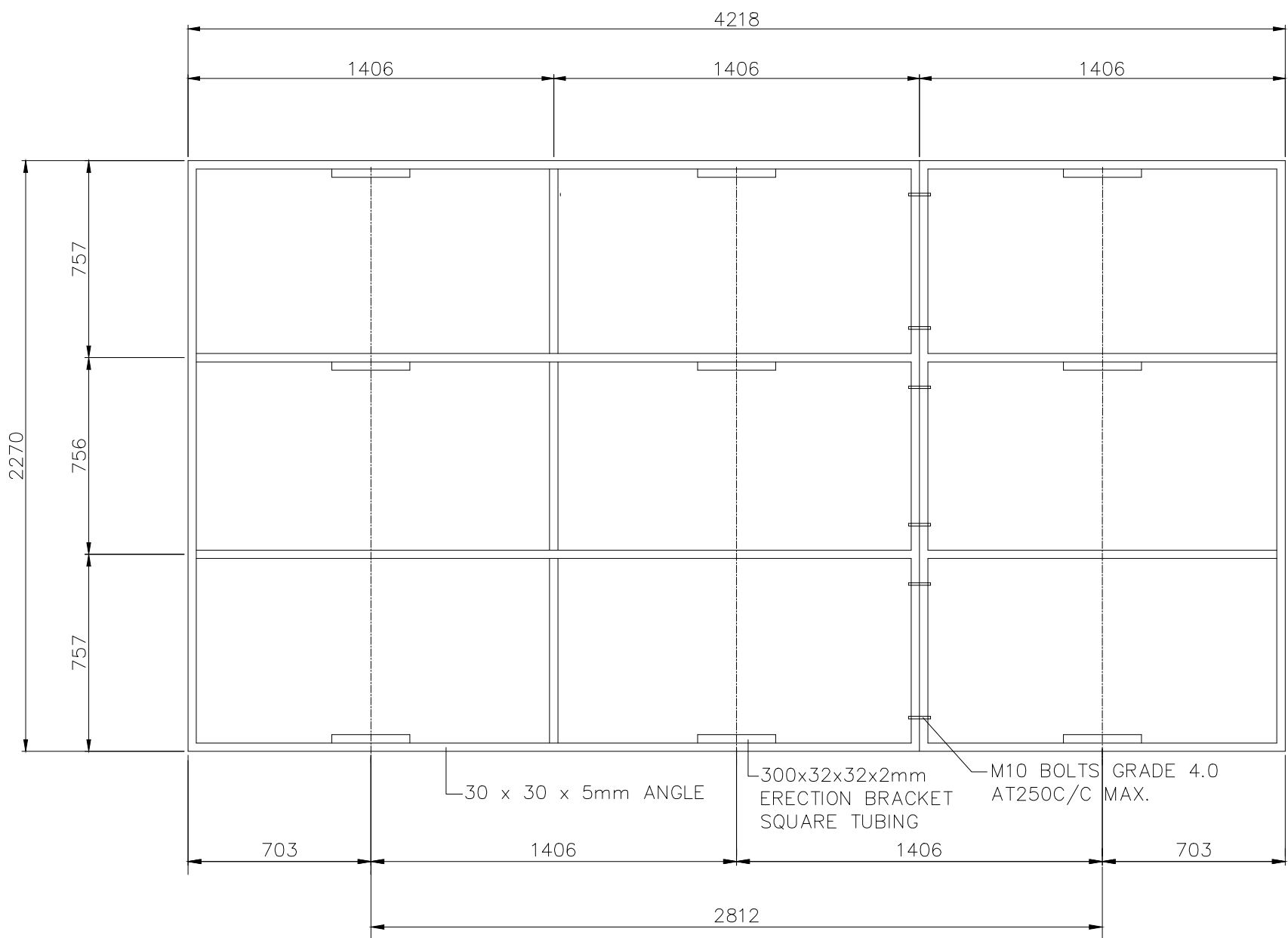
PROJECT NAME	REFURBISHMENT OF HARPER BOOSTER PUMP STATION
DRAWING TITLE	HARPER BOOSTER PUMP STATION LAYOUT

DRAWING No. 25007-03-H-02	SCALE 1:250
ORIGINAL SHEET SIZE A1	REVISION No. 0
CONTRACT No. VDM/TECH/17/03/2026/03	SHEET No. SHEET 2 of 2

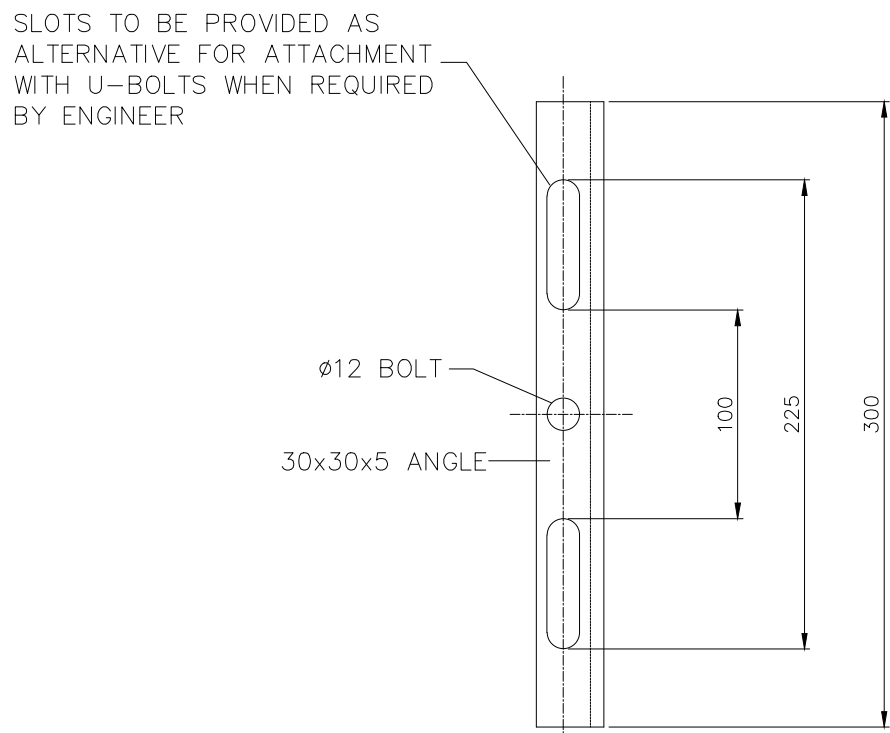
INFORMATION BOARD DETAILS



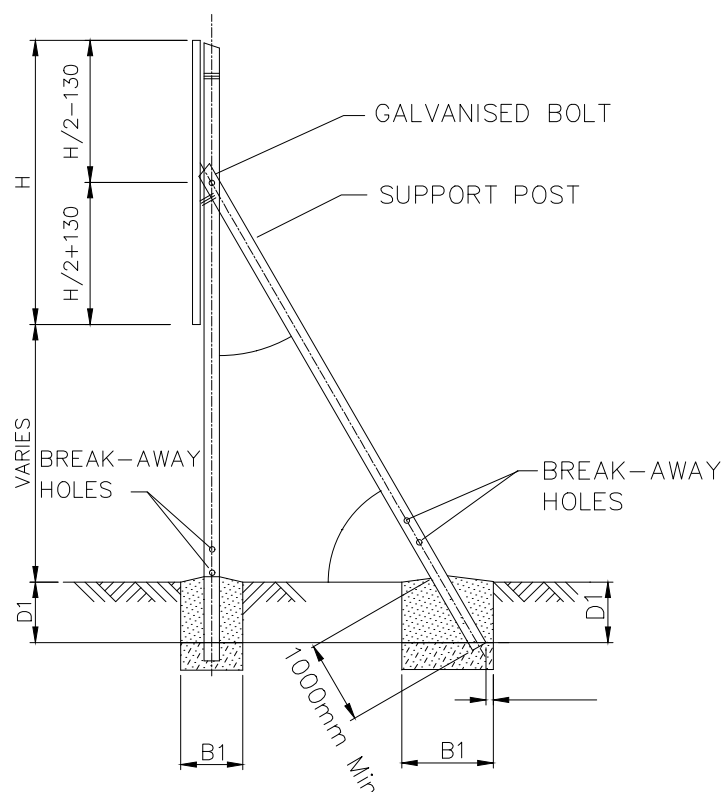
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SCALE 1:50



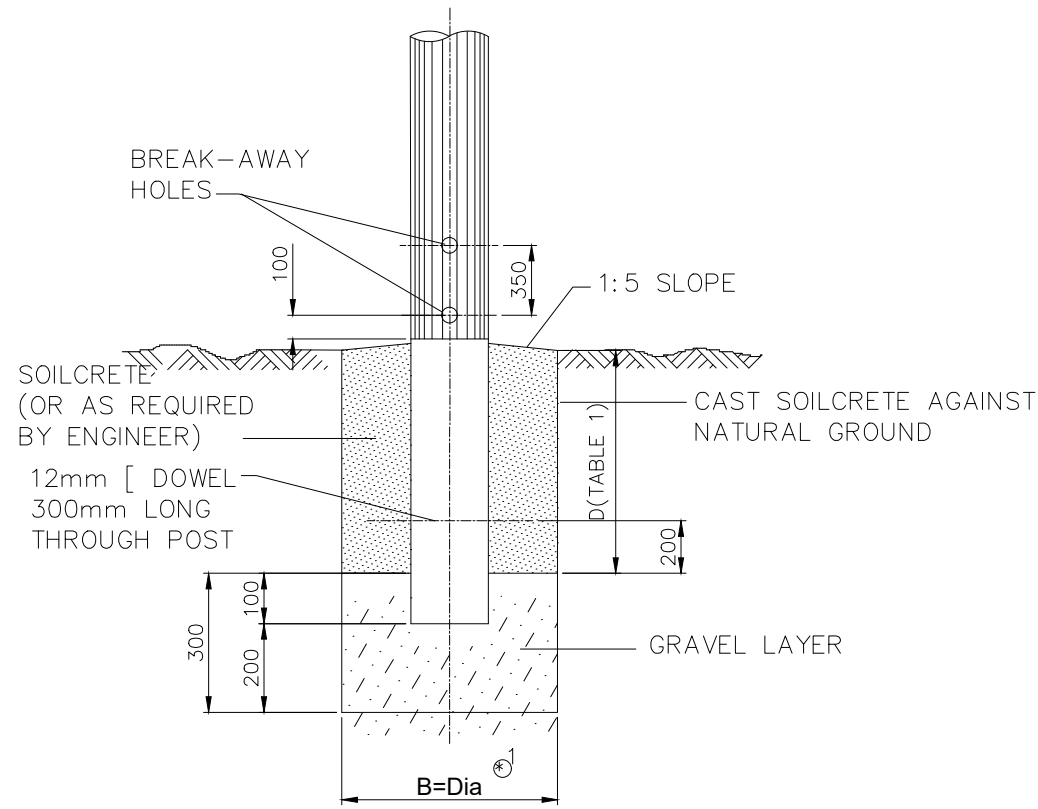
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SCALE 1:50



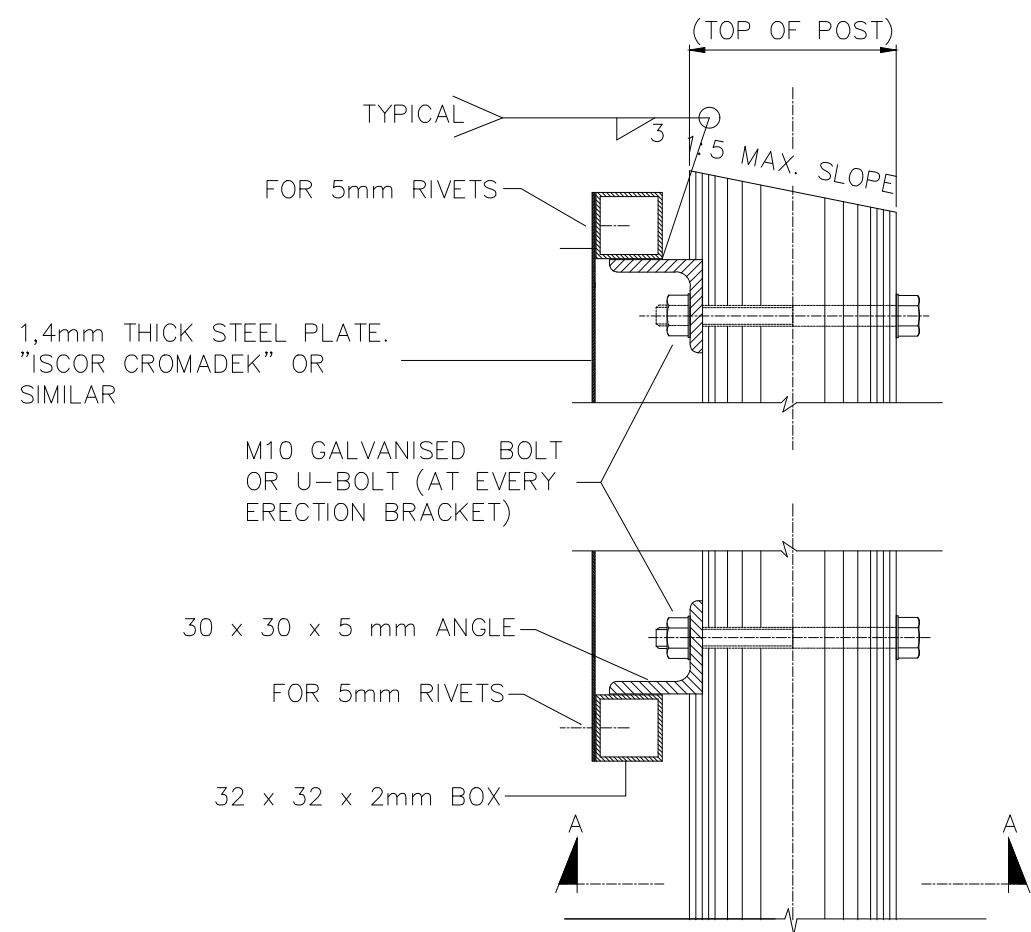
ELEVATION OF
ERECTION BRACKET
SCALE 1:25



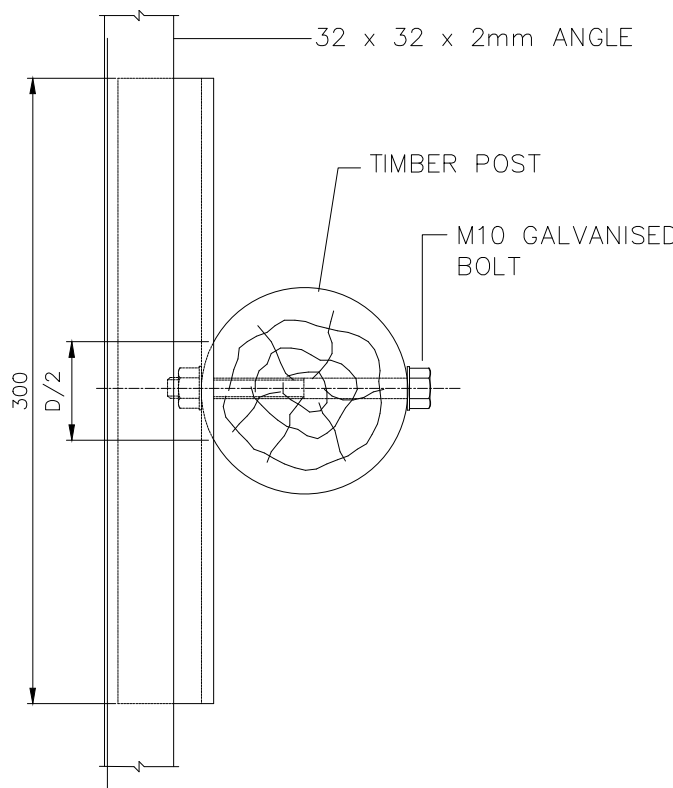
SIDE ELEVATION OF ROAD SIGN
SCALE 1:100



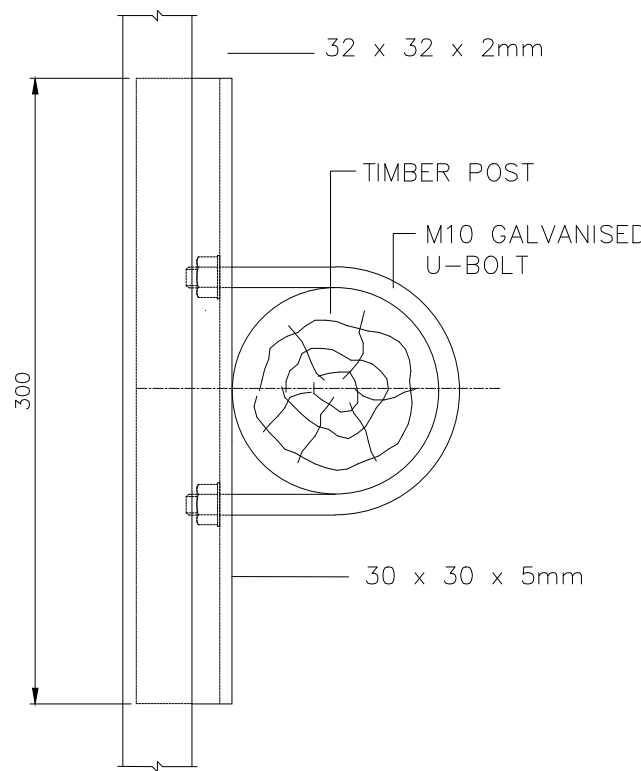
FOUNDATION DETAIL
SCALE 1:25



SIDE ELEVATION
SCALE 1:5



SECTION A-A
SCALE 1:5



SECTION A-A
(WITH U-BOLT)
SCALE 1:5

EMBLEM:

- ALL EMBLEMS TO BE DISPLAYED IN FULL COLOUR ON A SEMI-MATT BACKGROUND.
- LETTERS AND NUMBERS:
DESCRIPTION : MATT-BLACK, SERIES DIN B LETTERS AND NUMBERS ON A SEMI-MATT SMOKE-GREY BACKGROUND.
- BORDERS:
BORDER : GREEN NON-REFLECTORIZED.
- QUANTITY:
TWO SIGN BOARDS, SHALL BE ERECTED AT POSITIONS AS DETERMINED BY THE ENGINEER.
- DESCRIPTION:
DESCRIPTION OF WORK (NUMBER OF KILOMETRES AND TYPE OF WORK, eg."13,5km RECONSTRUCTION OF ROAD 1974." DESCRIPTION STARTS CENTERED ON THE LEFT-HAND SIDE AND THE FIRST 105mm-DIMENSION BELOW "NORTHERN"
- SAFCEC EMBLEM ONLY IF CONTRACTOR IS A MEMBER OTHERWISE BLANK.
- NEW SAACE LOGO TO BE OBTAINED FROM SAACE, JOHANNESBURG.

TABLE 1: DETERMINATION OF POSTS & FOOTINGS				
ERECTION DETAILS				
TYPE OF POST	UPRIGHT	STAY	D	B(DIA)
TIMBER POST AND STAY	100mm	80mm	600mm	850mm
TIMBER POST	180mm	-	1000mm	1450mm
D SECTION STEEL POST	100mm x 4mm	-	1000mm	1450mm

DETERMINATION OF BREAK-AWAY HOLES	
POLE DIA (m)	HOLE DIA (mm)
< 14	NONE
141 - 170	40
171 - 200	50
201 - 225	65

No	DATE	REVISION	CONSULT	DIR
A	03/2026	FOR TENDER	J.M	

NOTES

STAMP

DESIGNED BY	OUMA SEOPLA
CHECKED BY	FIDELIUS MAZENGURA
DRAWN BY	OUMA SEOPELA
CHECKED BY	FIDELIUS MAZENGURA
APPROVED BY	ALEX CHIUSWA
SIGNATURE	

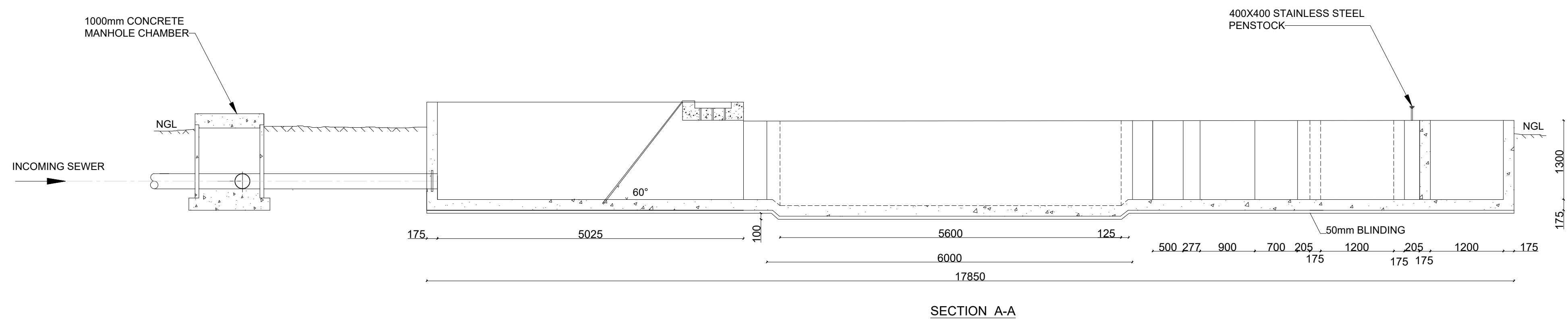
CLIENT	
VHEMBE DISTRICT MUNICIPALITY OLD PARLIAMENT BUILDING TICHOYANDOU 0950	TEL: 015 960 2000 FAX: 015 962 1017

CONSULTANT	
24A RISSIK STREET POLOKWANE 0700	TEL: 015 297 5906 FAX: 086 246 0744 EMAIL: admin@hwaeng.co.za

PROJECT NAME	REFURBISHMENT OF HARPER WWTW
DRAWING TITLE	CONSTRUCTION NAMEBOARD

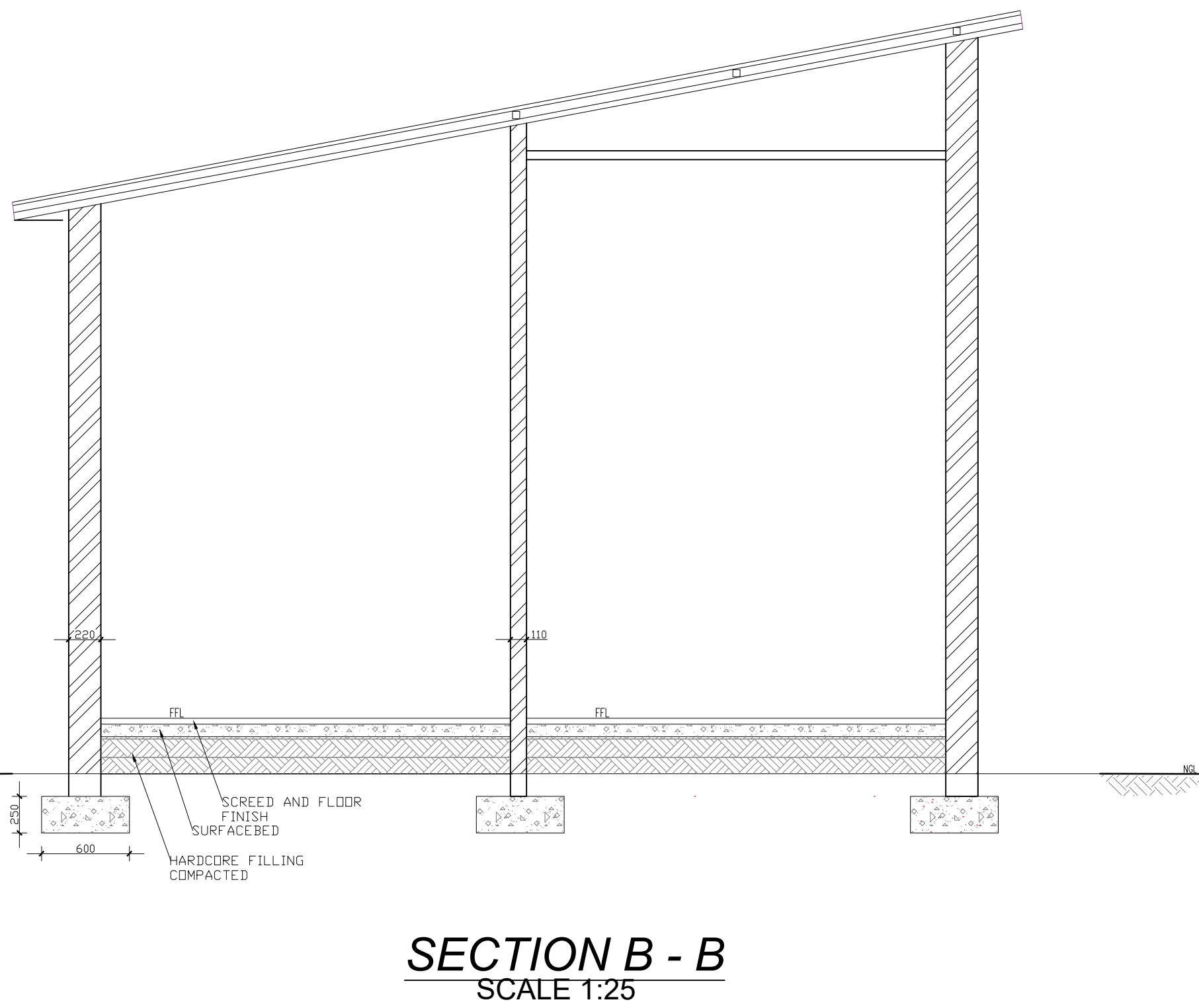
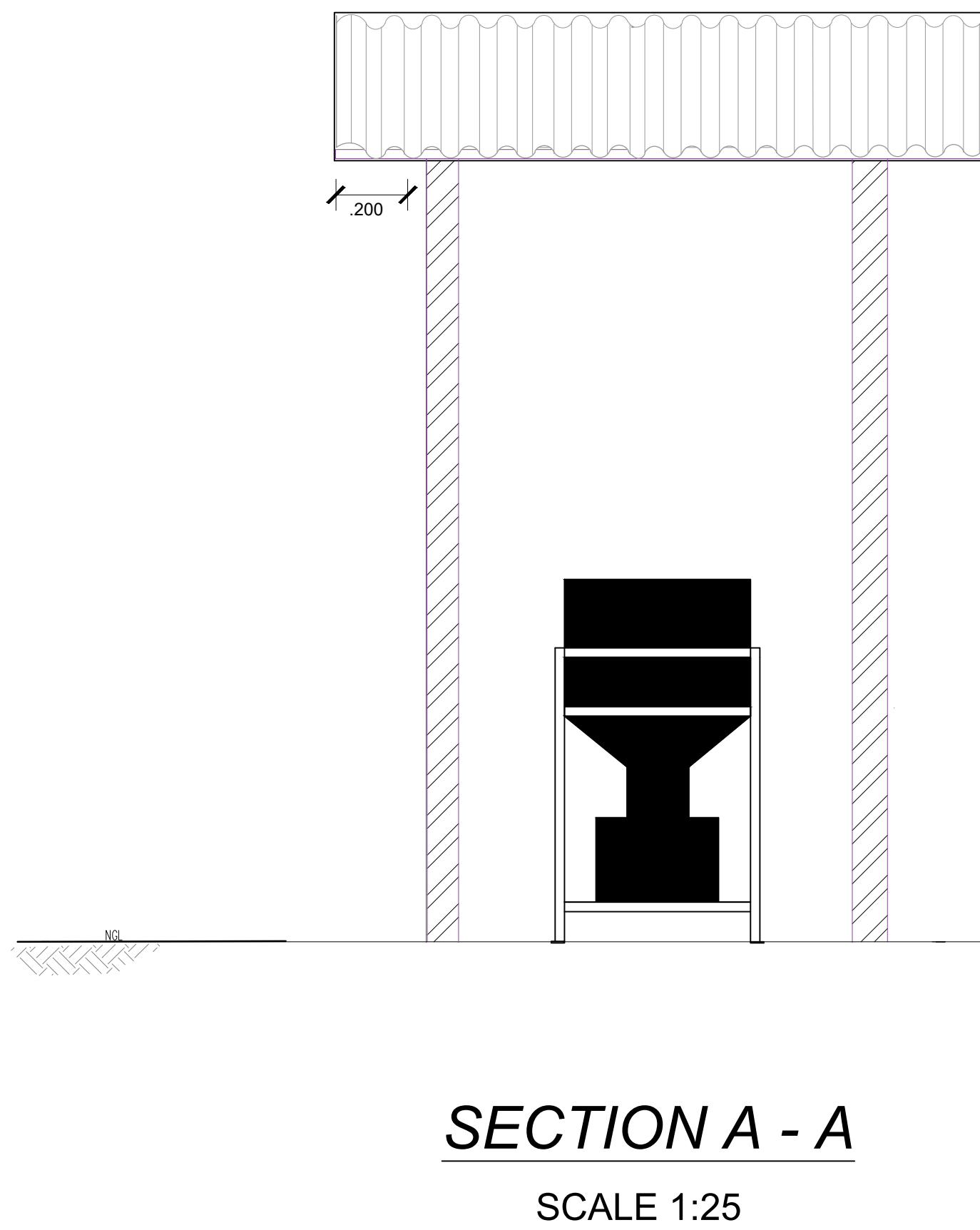
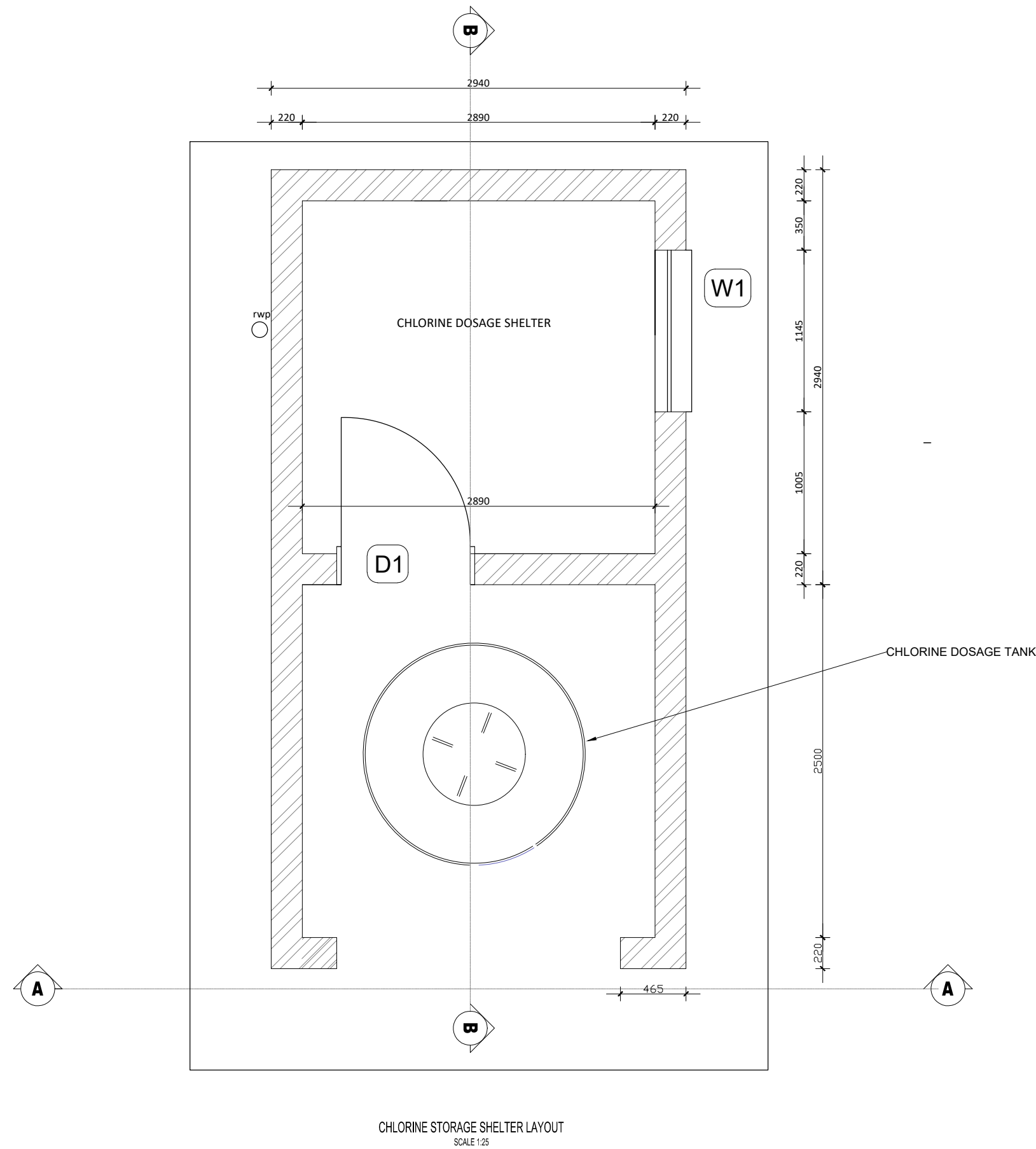
DRAWING No. 25007-03-H-01	CONTRACT No. VDM/TECH/17/03/2026/03
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SCALE AS SHOWN	REVISION No. A	SHEET No. SHEET 1 OF 1
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- 3.3. FOUNDATION SHALL BE A MINIMUM OF 25MPa AT 28 DAYS.

[illegible]



GENERAL NOTES :

- * ALL DIMENSIONS AND LEVELS ARE TO BE VERIFIED ON SITE PRIOR TO COMMENCING SETTING OUT , WORKSHOP DRAWINGS OR CONSTRUCTION .
- * FIGURED DIMENSIONS ONLY TO BE USED .
- * DISCREPANCIES , ERRORS AND OMISSIONS ARE TO BE REPORTED TO ARCHITECTS IMMEDIATELY THEY BECOME EVIDENT .
- * SHOP DRAWINGS TO BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE OR INSTALLATION .
- * COPYRIGHT AND RIGHT OF REPRODUCTION OF THIS DRAWINGS OR ANY PORTION THEREOF IS RESERVED MLA ARCHITECTS .

WINDOW SCHEDULE:

- W1 - CAT. No. : STANDARD MILDSTEEL RESIDENTIAL TYPE SIDE-HUNG MILDSTEEL WINDOW, CODE -WC1 SP (900 x 595)
- GLAZING : 4mm CLEAR FLOATED SHEET GLASS FIXED WITH GLAZING PUTTY PUTTY TO RECEIVE PAINT FINISH TO MATCH WINDOW FRAME.
- FINISH : CLEAN WITH STEEL BRUSH & APPLY 1 COAT DURAPHOS, 1 UNIVERSAL UNDERCOAT & TWO COATS GLOSS ENAMEL PAINT. COLOUR AS PER ARCHITECT.
- No OF WINDOWS : 1 (ONE) PROVIDE BURGLAR BARS OUT OF 12 x 12mm M/S SQUARE SOLID BARS TO LINE UP WITH VERTICAL & HORIZONTAL SECTIONS OF WINDOWS - FINISH DITTO FRAME
- W2 - CAT. No. : STANDARD MILDSTEEL RESIDENTIAL TYPE SIDE-HUNG MILDSTEEL WINDOW, CODE - WA2 SP LH/RH (1500 x 1145)
- GLAZING : 4mm CLEAR FLOATED SHEET GLASS FIXED WITH GLAZING PUTTY PUTTY TO RECEIVE PAINT FINISH TO MATCH WINDOW FRAME.
- FINISH : CLEAN WITH STEEL BRUSH & APPLY 1 COAT DURAPHOS, 1 UNIVERSAL UNDERCOAT & TWO COATS GLOSS ENAMEL PAINT. COLOUR AS PER ARCHITECT.
- No OF WINDOWS : 2 (TWO) PROVIDE BURGLAR BARS OUT OF 12 x 12mm M/S SQUARE SOLID BARS TO LINE UP WITH VERTICAL & HORIZONTAL SECTIONS OF WINDOWS - FINISH DITTO FRAME

DOOR SCHEDULE:

- DOOR : 813x2032x44mm SERVICE STEEL DOOR AND FRAME COMBO
- 813x2032x40mm INTERIOR MASONITE HARDBOARD DOOR & FRAME
- HINGES - 2x100mm M/S BUTTERFLY HINGES PER DOOR LEAF
- LOCKSET - "SOLID BLESBOK" 460/313 2-LEVER LOCKSET.

0	03/2026	FOR TENDER	J.M		
No	DATE		CONSULT	DIR	

NOTES	

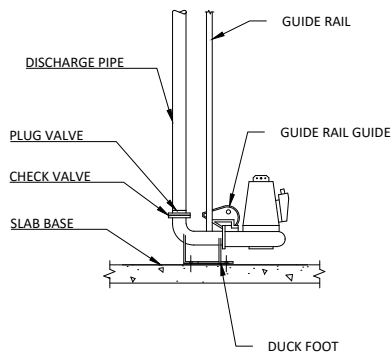
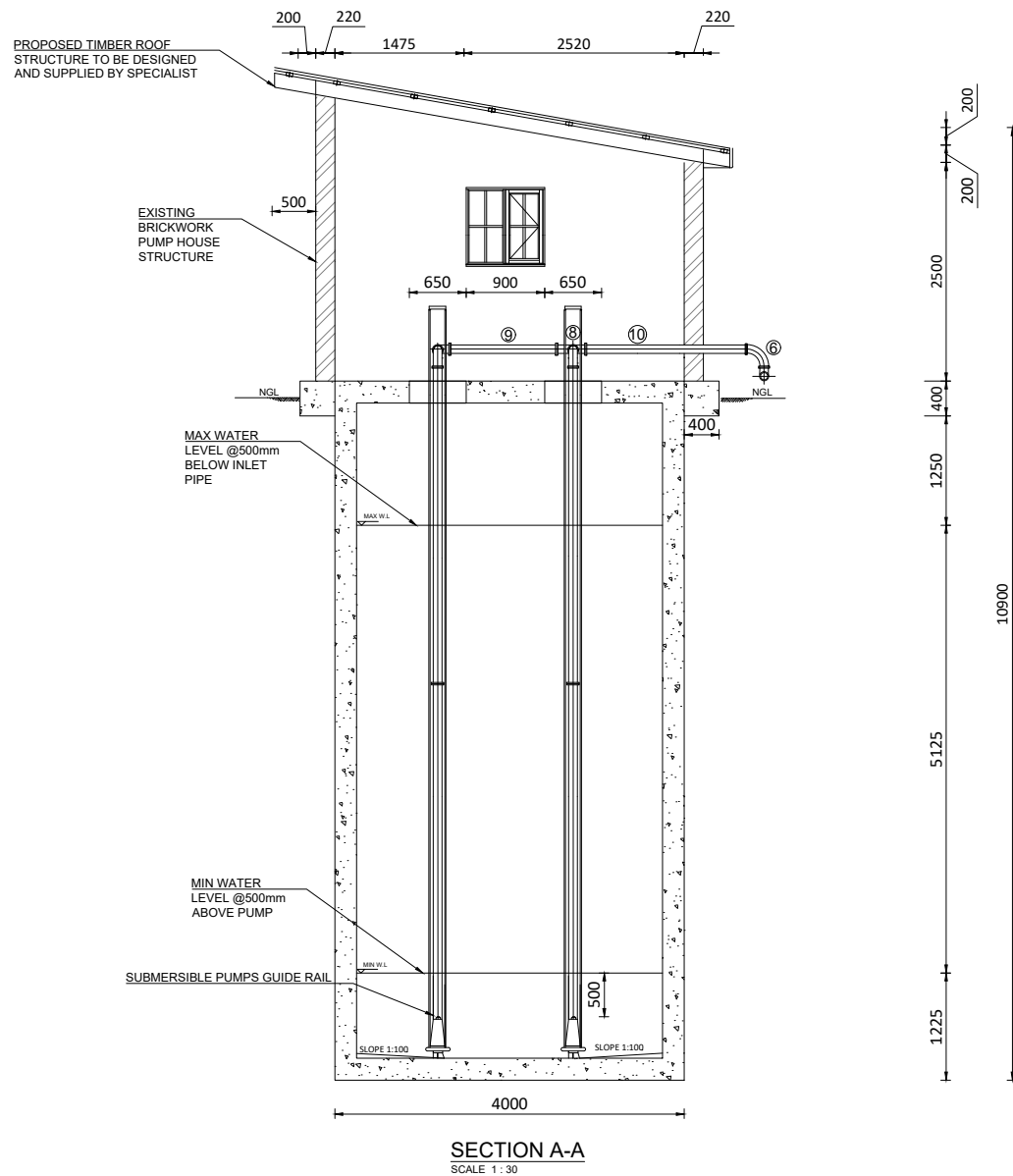
DESIGNED BY	T.M
CHECKED BY	F.M
DRAWN BY	T.S
CHECKED BY	F.M
APPROVED BY	ALEX CHIUWA
SIGNATURE	

CLIENT		TEL: 015 960 2000 FAX: 015 962 1017
VHEMBE DISTRICT MUNICIPALITY OLD PARLIAMENT BUILDING THOKOYANDOU 0950		

CONSULTANT		TEL: 015 297 5906 FAX: 086 246 0744 EMAIL: admin@hwaeng.co.za
127 MARSHALL STREET POLOKWANE		

PROJECT NAME	REFURBISHMENT OF HARPER WWTP
DRAWING TITLE	CHLORINE DOSAGE STATION

DRAWING No. 25007-03-H-08	SCALE AS SHOWN
	REVISION No. 0
CONTRACT No. (VDM/TECH/17/03/2026/03)	SHEET No. SHEET 1 OF 1



DETAIL A
SCALE 1 : 20

DRAWING NOTES

1. THIS DRAWING IS THE PROPERTY OF HWA ENGINEERS & PROJECT MANAGERS. COPYRIGHT PATENTS AND ALL INDUSTRIAL RIGHTS RESERVED.
2. READ THIS PLAN IN CONJUNCTION WITH ALL THE RELEVANT DRAWINGS.
3. READ THIS PLAN IN CONJUNCTION WITH THE ARCHITECT'S DRAWINGS WHEN APPLICABLE.
4. ALL DIMENSIONS IN MILLIMETRES.
5. ONLY DIMENSIONS SHOWN ON THE DRAWINGS MAY BE SCALED WITHOUT THE WRITTEN INSTRUCTION OF THE ENGINEER.
6. ALL LEVELS AND DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO THE COMMENCEMENT OF ANY WORK, AND THE ENGINEER TO BE NOTIFIED IN CASE OF ANY DISCREPANCIES.
7. ANY APPROVAL, CHECK, CERTIFICATE, CONSENT, EXAMINATION, INSPECTION, INSTRUCTION, NOTICE, OBSERVATION, PROPOSAL, REQUEST, TEST OR SIMILAR ACT BY THE ENGINEER (INCLUDING ABSENCE OF DISAPPROVAL) SHALL NOT RELIEVE THE CONTRACTOR FROM ANY RESPONSIBILITY HE HAS UNDER THE CONTRACT, INCLUDING RESPONSIBILITY FOR ERRORS, OMISSIONS, DISCREPANCIES AND NON-COMPLIANCES.

PIPE SUPPORT NOTES

1. PIPE SUPPORT TO BE FULLY WELDED BY CODED WELDER.
2. ALL WELDS TO BE FULL PENETRATION 6mm FILLET WELDS.
3. PIPE SUPPORTS TO BE FABRICATED FROM X42 STRUCTURAL STEEL
4. BOTTOM HALF OF THE PIPE SUPPORT SUPPORT TO BE HOT DIPPED GALVANIZED AFTER COMPLETION.
5. ALL PIPE SUPPORT BEAMS THAT ARE FULLY WELDED TO PIPE FITTINGS TO BE EPOXY ENAMEL.
6. ALL PIPE SUPPORTS TO BE INSPECTED IN WORKSHOP BY THE ENGINEER PRIOR TO INSTALLATION.
7. THE ENGINEER TO IDENTIFY ALL SUPPORTS POSITION & VERIFY ALL DIMENSIONS ON SITE PRIOR TO FABRICATION.

RECTAGRID NOTES

- 1) ENTIRE RECTANGID FRAME TO BE FABRICATED FROM 50 x 50 x 3mm THICK MILD STEEL EQUAL LEG ANGLE COMPLETE WITH RS40 GRATING 40 x 4.5 AND TO BE OF FULLY WELDED.
(ALL WELDS TO BE 6mm FILLET WELDS FULL PENETRATION)
- 2) THE RECTANGID PANELS ARE TO BE HOT DIP GALVANIZED AFTER FABRICATION TO PROVIDE A MINIMUM THICKNESS OF 105 MICRON IN ACCORDANCE WITH SANS ISO 1461 AND SANS ISO 14713 (AS AMENDED).
- 3) DRAINAGE CANAL PANELS TO HAVE 3mm GAP BETWEEN PANELS FOR EASY REMOVAL
- 4) PURPOSE MADE M.C.C FRAME TO BE FABRICATED FROM 140 x 60 x 16.2 kg/m CHANNEL AND TO BE OF FULLY WELDED.
(ALL WELDS TO BE 6mm FILLET WELDS FULL PENETRATION)
- 5) PURPOSE MADE M.C.C FRAME TO BE HOT DIP GALVANIZED AFTER FABRICATION TO PROVIDE A MINIMUM THICKNESS OF 105 MICRON IN ACCORDANCE WITH SANS ISO 1461 AND SANS ISO 14713 (AS AMENDED).

THESE NOTES APPLY TO ALL THE SCHEDULES HERE FOLLOWING

1. PIPE WALL THICKNESSES SHALL BE AS SPECIFIED IN THE TABLE ON THE SCHEDULE OF FITTINGS
2. ALL FLANGES TO BE DRILLED SANS 1123-2003 (EDITION 3) TABLES 1000/3; 1600/3; 2500/3; 4000/3 AS DETAILED AND REFERRED TO AS 1000/3; 1600/3; 2500/3 AND 4000/3 IN THE SCHEDULE OF FITTINGS.
3. MAKE OF ALL VALVES TO BE APPROVED BY ENGINEER IN WRITING
4. THE LENGTHS OF PIPES AND FITTINGS ARE APPROXIMATE ONLY. ACTUAL LENGTH TO BE ADVISED ONLY AFTER APPROVAL OF VALVES BY ENGINEER.
5. NO ALLOWANCES HAVE BEEN MADE IN PIPE AND FITTING DIMENSIONS FOR PACKINGS, GASKETS AND GAPS BETWEEN PIPE WORK PROVISION FOR THESE TO BE MADE BY SUPPLIERS
6. FLANGE HOLES TO BE DRILLED TO ALLOW EXACT ALIGNMENT VERTICALLY AND HORIZONTALLY, AS DETAILED ON THE DRAWINGS, OF ALL PIPE WORK AND EQUIPMENT.

7. WHERE PLAIN ENDS, FOR FLEXIBLE COUPLINGS, ARE CALLED FOR ON STEEL PIPES, THE DIMENSIONS OF SUCH PLAIN ENDS AND THE CORRESPONDING FLEXIBLE COUPLINGS ARE TO BE MATCHED.
8. ALL WELDING TO BE FULL STRENGTH, FULL PENETRATION.
9. RADII APPLICABLE TO PIPE PEDESTALS AND STRAPS TO BE VERIFIED FOR FULL SUPPORT OF PIPE OVER ENTIRE SUPPORT AND STRAPPING AREA.

10. CORROSION PROTECTION TO BE IN ACCORDANCE WITH SPECIFICATIONS, AS SET OUT IN THE CONTRACT DOCUMENT. LEGEND OF CORROSION PROTECTION TREATMENT AS FOLLOWS:

G	:	GALVANIZING
GMS	:	HOT DIP GALV.
ET	:	EPOXY TAR
EC	:	EPOXY COATING
EE	:	EPOXY ENAMEL COATING
SS	:	STAINLESS STEEL 316
D	:	DENSO TAPE WRAPPING
P	:	PAINTING
FBE	:	FUSION BONDED EPOXY
FBDPE	:	FUSION BONDED, MEDIUM DENSITY, POLYETHYLENE
COATING	:	REFER TO COT SPECIFICATIONS

- a. GALVANIZING WHERE GALVANIZING IS SPECIFIED IT SHALL BE CARRIED OUT BY THE HOT DIP PROCESS TO PROVIDE A MINIMUM THICKNESS OF ZINC COATING OF 105 MICRON IN ACCORDANCE WITH SANS ISO 1461 AND SANS ISO 14713 (AS AMENDED).
- b. TWO PACK EPOXY PRIOR TO EPOXY COATING OR LINING TAKING PLACE. ALL PIPES AND FITTINGS SHALL BE PREPARED AND TREATED IN ACCORDANCE WITH THE PARTICULAR SPECIFICATION IN THE DOCUMENT. THE EPOXY COATING/LINING SHALL BE APPLIED IN THE WORKSHOP BY SPRAYING TO A FINAL DRY FILM THICKNESS OF NOT LESS THAN 500 MICRON. AFTER INSTALLATION ANY CHIPS OR SCRATCHES SHALL BE MADE GOOD ON SITE WITH BRUSH APPLIED EPOXY PAINT, WHERE AFTER A FINAL TOP COAT, ACCORDING TO THE STANDARD DWAS COLOUR CODING SYSTEM, SHALL BE APPLIED TO ALL EXPOSED EPOXY COATED SURFACES TO A MINIMUM DRY FILM THICKNESS OF 30 MICRON.
- c. ALL BURIED, WELDED JOINTS, BENDS, SCOUR TEES, TEES, ETC. SHALL BE WRAPPED WITH AN APPROVED CORROSION PROTECTIVE TAPE SYSTEM OR HEAT SHRINKABLE SLEEVE IN ACCORDANCE WITH THE REQUIREMENTS OF EN 12068 CLASS C, HT50 CUV AND COT AMENDED SPECIFICATIONS SERIES 4.401 AND 402.
- d. ALL BURIED PIPE COUPLINGS ARE TO BE TREATED WITH A PETROLATUM MASTIC BLANKET AND COATED TAPE BACKING, WHERE AFTER THE JOINT IS TO BE PLASTIC WRAPPED, ACCORDING TO SPECIFICATION.

11. THESE SCHEDULES ARE TO BE READ IN CONJUNCTION WITH THE DRAWINGS AND SPECIFICATIONS.
12. ALL LEVELS TO BE VERIFIED ON SITE PRIOR TO THE COMMENCEMENT OF ANY WORK AND THE ENGINEER IS TO BE NOTIFIED IN CASE OF ANY DISCREPANCIES.
13. ALL PACKINGS, NUTS, BOLTS AND WASHERS TO BE SUPPLIED WITH FITTINGS TO ENSURE THE COMPLETE INSTALLATION AND CORRECT OPERATION OF THE ENTIRE PUMPING EQUIPMENT AND/OR PIPE WORK INSTALLATION.
14. ALTHOUGH THE USE OF FINE THREAD NUTS AND BOLTS IS SOUND ENGINEERING PRACTICE FOR COUPLING OF FLANGED FITTINGS, IT IS NOT OBLIGATORY. THE ONUS REMAINS ON THE CONTRACTOR TO ENSURE A DRIP TIGHT FIT WITHOUT WARPING OF FLANGES.
15. ALL BOLTED CONNECTIONS TO BE PETROLATUM COATED, IN ACCORDANCE WITH COT AMENDED STANDARD SPECIFICATIONS SERIES 4.402, SPECIFICATION PS402.05.04.
16. FASTENERS: ALL FASTENERS, UNLESS OTHERWISE SPECIFIED, ARE TO BE MILD STEEL, HOT DIP GALVANIZED, WITH THREADS COATED WITH MOLYBDENUM DISULPHIDE LUBRICANT.
17. ALL HOT DIP GALVANIZED MILD STEEL BOLT AND NUT THREADS ARE TO BE COATED WITH MOLYBDENUM DISULPHIDE LUBRICANT OR WAX, AND ALL STAINLESS STEEL BOLT AND NUT THREADS ARE TO BE COATED WITH NICKEL ANTI-SIEZE COMPOUND PRIOR TO FASTENING.
18. ALL STEEL PIPES & FITTINGS IN CONFORMITY WITH SANS 791 / 2002 GRADE B WITH DESIGN STRESS OF 300MPa

PUMP STATION DELIVERY PIPE SCHEDULE								
REF	QUANTITY	SIZE	DESCRIPTION	PIPE MATERIAL	PIPE CLASS	JOINING SYSTEM		
						LINING	COAT	
1	1	100/50	FLANGED STEEL REDUCER	STAINLESS STEEL	PN25	FBE	FBE	
2	4	100	FLANGED STEEL PIPE 3500mm LONG	STAINLESS STEEL	PN25	FBE	FBE	
3	7	100	FLANGED 90° SHORT RADIUS BEND	STAINLESS STEEL	PN25	FBE	FBE	
4	2	100	FLANGED NON-RETURN VALVE	STANDARD ITEMS	PN25	FBE	FBE	
5	2	100	FLANGED STEEL PIPE 1200mm LONG	STAINLESS STEEL	PN25	FBE	FBE	

0	03/2026	FOR TENDER	J.M	
No	DATE	REVISION	CONSULT	DIR

[illegible]

STAMP	
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DESIGNED BY	M.L
CHECKED BY	A.C
DRAWN BY	M.L
CHECKED BY	M.M
SIGNATURE	*****

CLIENT



VHEMBE DISTRICT MUNICIPALITY
OLD PARLIAMENT BUILDING
THOHOYANDOU
0950

TEL: 015 960 2000
FAX: 015 962 1017

CONSULTANT

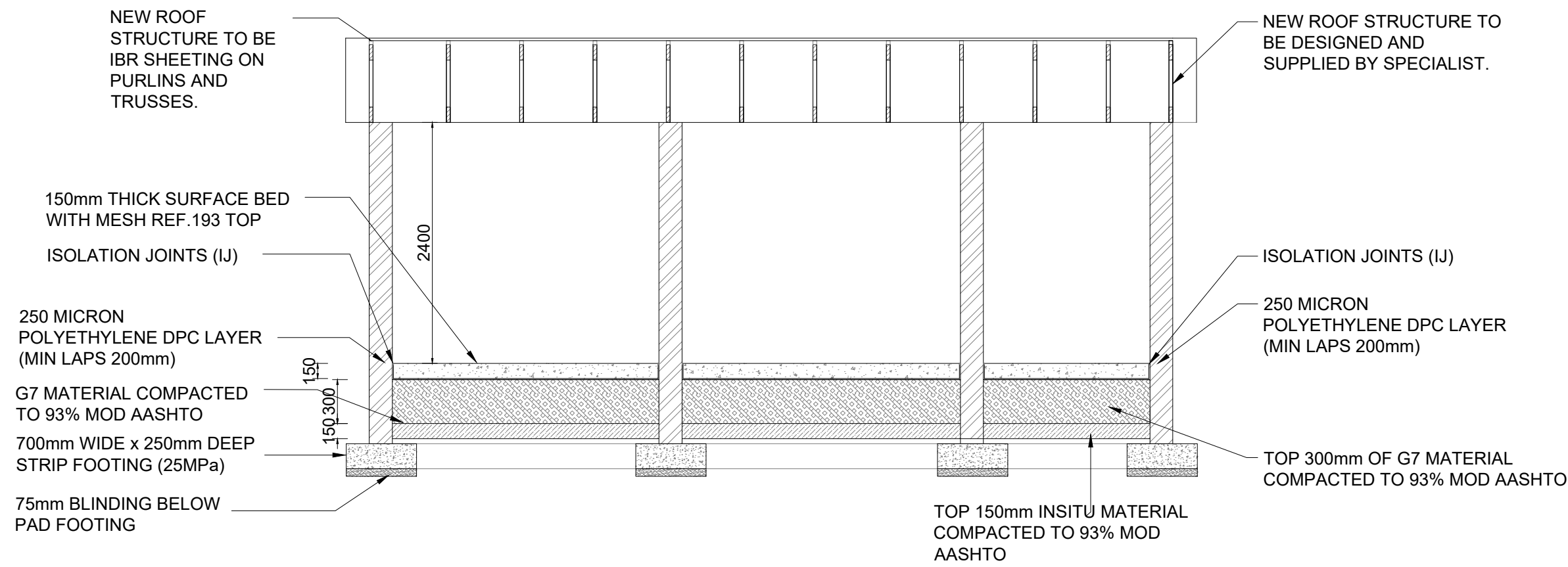

The logo for HWA Engineering & Surveying features a stylized blue and white geometric design at the top, followed by the letters 'HWA' in a large, bold, blue serif font. Below 'HWA' is the tagline 'Engineering & Surveying' in a smaller, italicized blue font, all contained within a blue rectangular border.

24A RISSIK STREET
POLOKWANE
0700

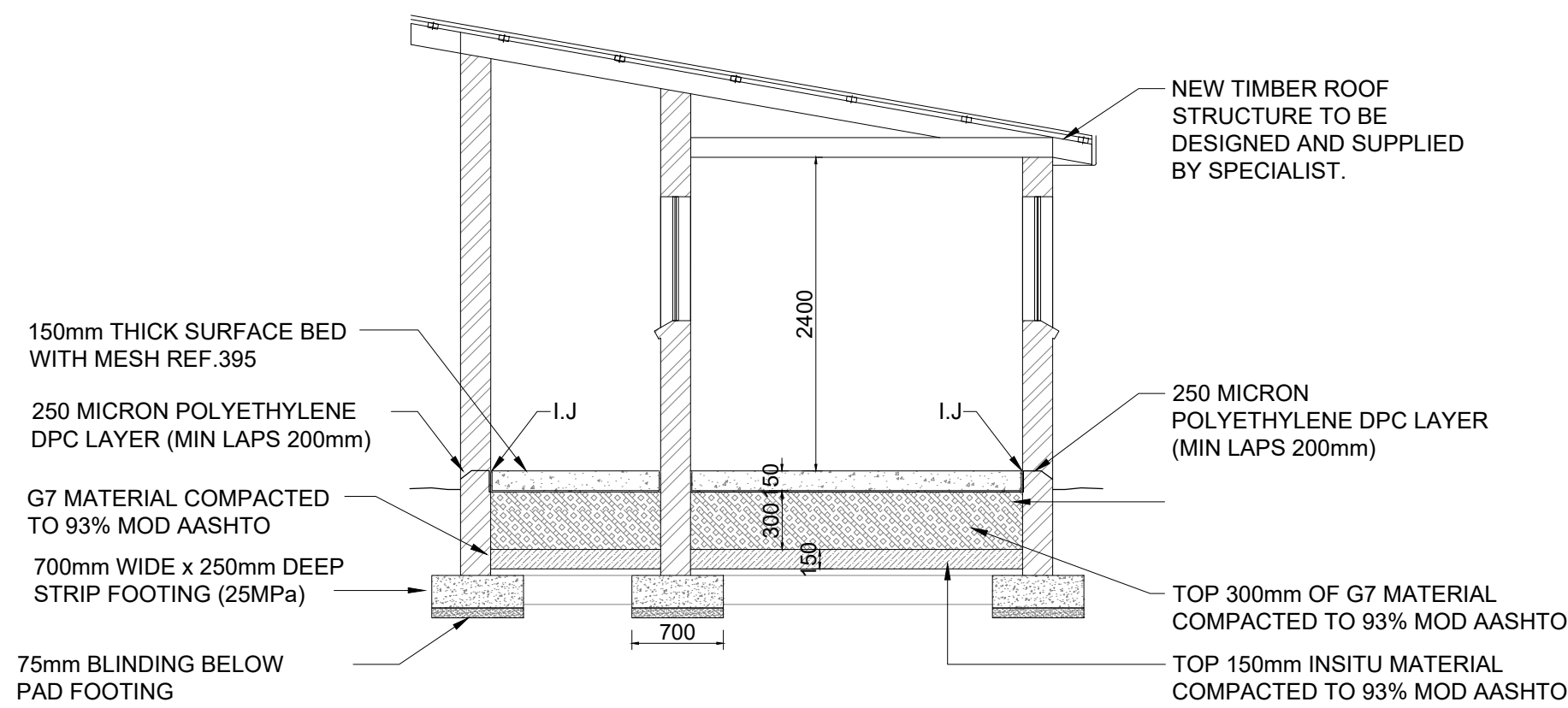
TEL: 015 297 5906
FAX: 086 246 0744
EMAIL: admin@hwaeng.co.za

PROJECT NAME	REFURBISHMENT OF HARPER SEWAGE PUMP STATIONS
DRAWING TITLE	HARPER PUMP STATION PIPE DETAILS

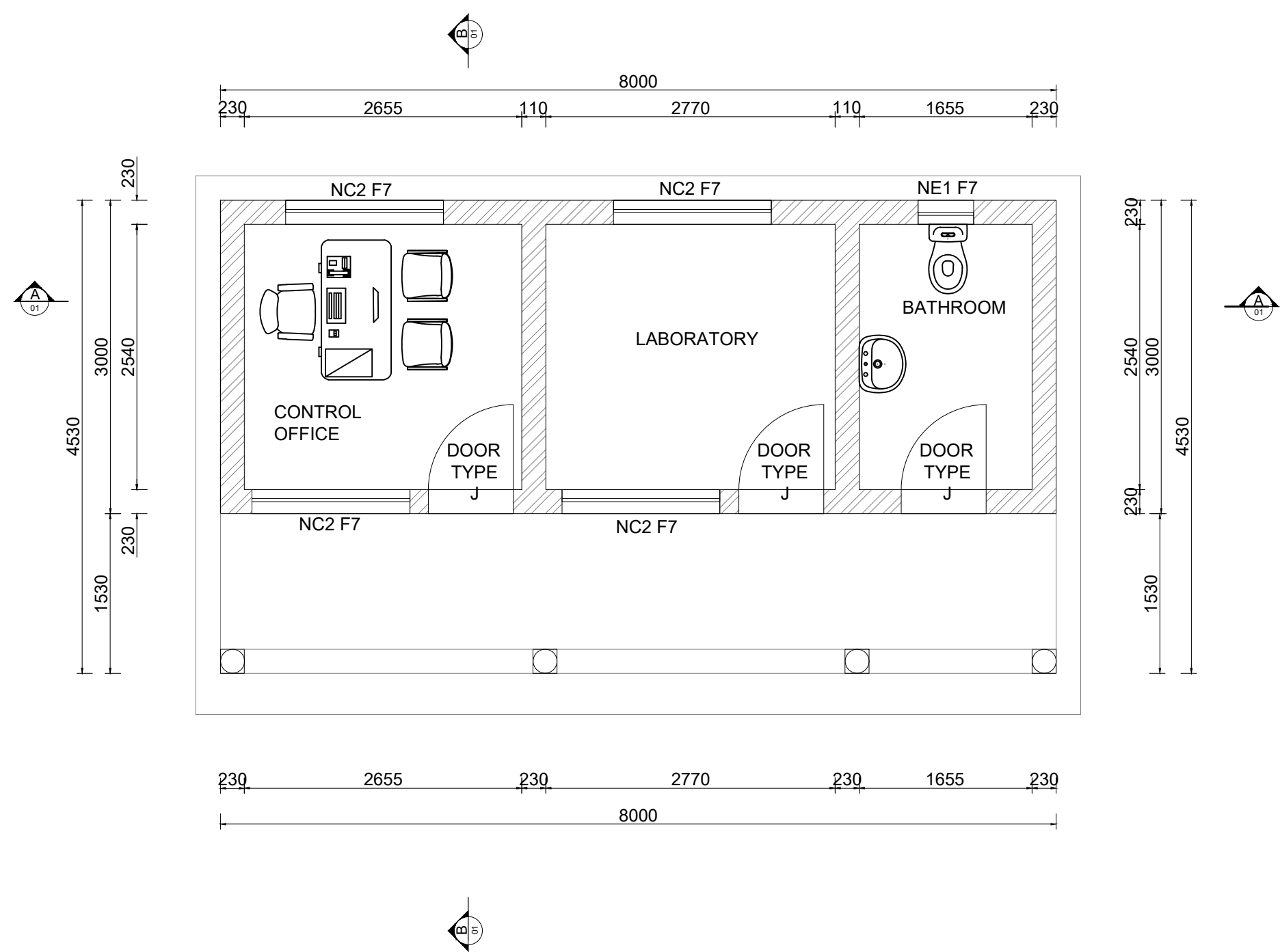
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	REVISION No. 0
CONTRACT No: VDM/TECH/17/03/2026/03	SHEET No. SHEET 1 OF 1



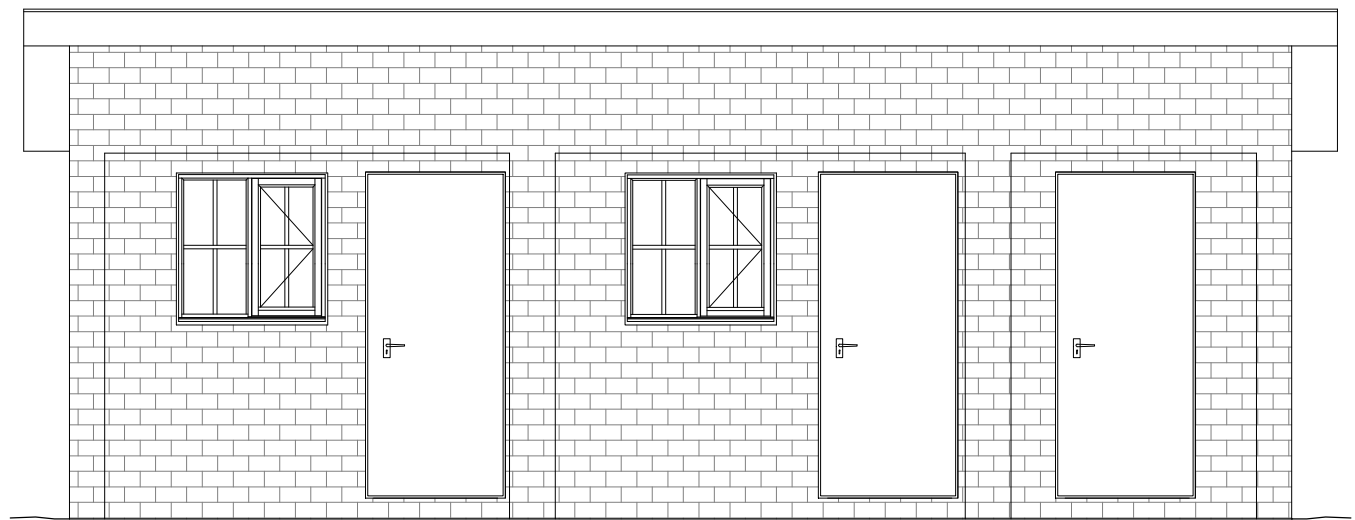
SECTION A-A
SCALE: 1:50



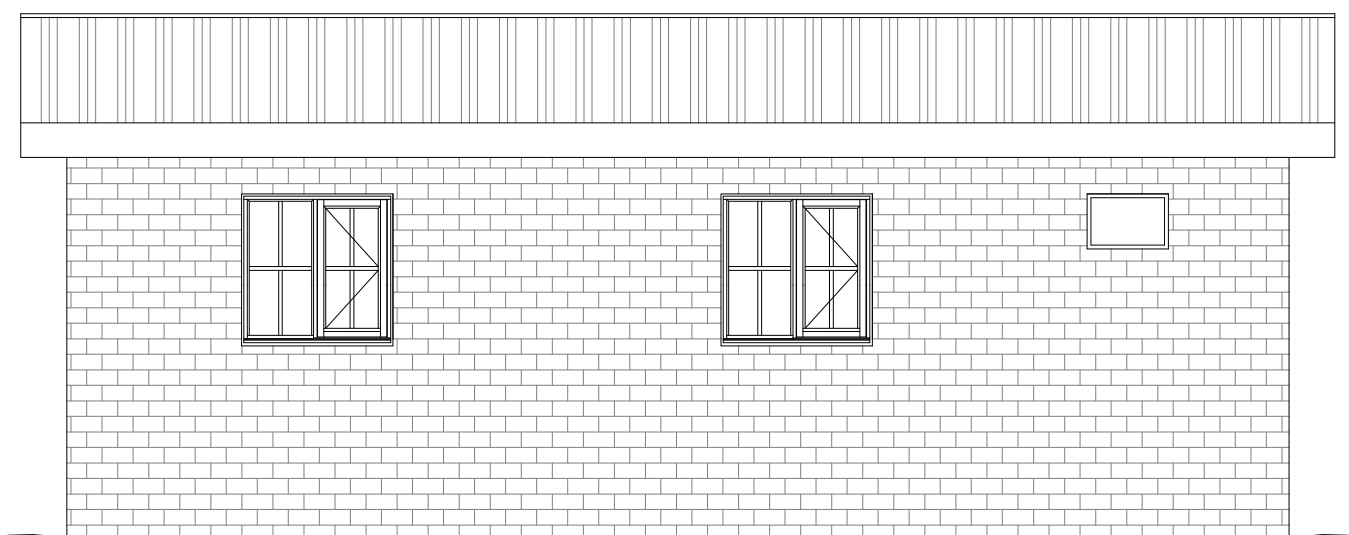
SECTION B-B
SCALE: 1:50



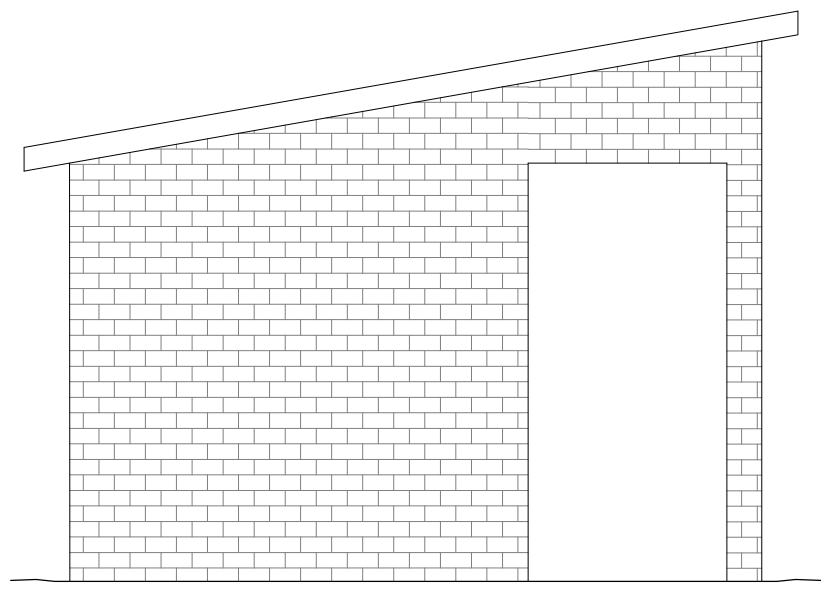
PLAN - OFFICE BUILDING
SCALE: 1:50



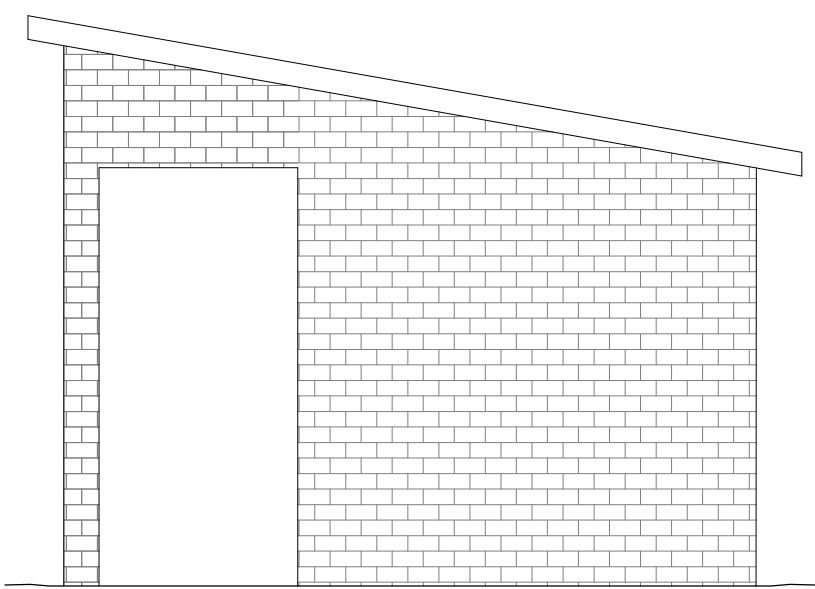
FRONT ELEVATION
SCALE: 1:50



BACK ELEVATION
SCALE: 1:50



SIDE ELEVATION
SCALE: 1:50



SIDE ELEVATION
SCALE: 1:50

NOTES:

- GENERAL:
- ALL CONSTRUCTION DONE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR MUNICIPAL CIVIL ENGINEERING WORKS, THIRD EDITION 2005.
 - ALL DIMENSIONS ARE IN MILLIMETERS. (UNLESS OTHERWISE SPECIFIED)
 - DO NOT SCALE THESE DRAWINGS.
 - ALL DIMENSIONS SHALL BE CHECKED AND APPROVED ON SITE.
 - ALL EXCAVATIONS TO BE SHORED. WHERE STABILITY OF EXCAVATION ARE LIKELY TO BE UNSTABLE, DUE TO TOO HIGH WALLS AND/OR INGRESS OF WATER, THE EXCAVATION SHALL BE PROTECTED USING SHEET PILES OR OTHER SUITABLE MEANS.

- CONCRETE:
- STRENGTHS
 - SURFACE BED: 25mPa/19mm STONE
 - STRIP FOOTINGS: 30mPa/19mm STONE

- WINDOWS AND DOORS:
- REFER TO DRAWING W01.JNB.000610-C-6.2 FOR WINDOW AND DOOR SCHEDULE

POSITION:
POSITION AND ORIENTATION OF BUILDING WILL BE INDICATED BY THE ENGINEER

FOUNDATION:
FOUNDATIONS SHOWN ARE FOR CONSTRUCTION IN STABLE GROUND. WHERE UNSTABLE GROUND SUCH AS LOOSE MATERIAL OR CLAYEY GROUND IS ENCOUNTERED, FOUNDATIONS ARE TO BE TO REVISED DETAILS PROVIDED BY THE ENGINEER.

BUILDING BLOCKS:
CONCRETE BUILDING BLOCKS SHALL COMPLY WITH THE REQUIREMENTS OF SABS 527 "CONCRETE BUILDING BLOCKS" CLASS A HOLLOW TYPE AND SHALL BE OF THICKNESS AS SHOWN IN THE DRAWING.

MORTAR :
MORTAR SHALL BE CLASS 2 MORTAR TO SABS 0164 COMPRISING 200 L LOOSE DAMP BUILDING SAND TO 50kg CEMENT

PLASTER :
PLASTER SHALL BE COMPOSED OF ONE PART OF CEMENT PLUS ONE TENTH PART LIME TO FOUR PARTS FINE PLASTER SAND

ROOF STRUCTURE:
ROOF TIMBERS SHALL COMPLY WITH SABS 763-1978 : GRADE 4

SHEETING:
GALVANIZED CORRUGATED IRON SHEETING COMPLYING WITH SABS 934 FOR CLASS Z600 COATING

PAINTING :
PLASTERED WALLS AND FIBRE CEMENT BOARDS : ONE COAT UNDERCOAT PLUS TWO COATS ACRYLIC PVA. STEEL WINDOWS AND DOOR : TWO COATS ENAMEL.

0	03/2026	FOR TENDER		J.M	
No	DATE		CONSULT	DIR	

NOTES	

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CHECKED BY	FIDELLIS MAZENGURA
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PROJECT NAME	REFURBISHMENT OF HARPER WWTP
DRAWING TITLE	OFFICE BUILDING

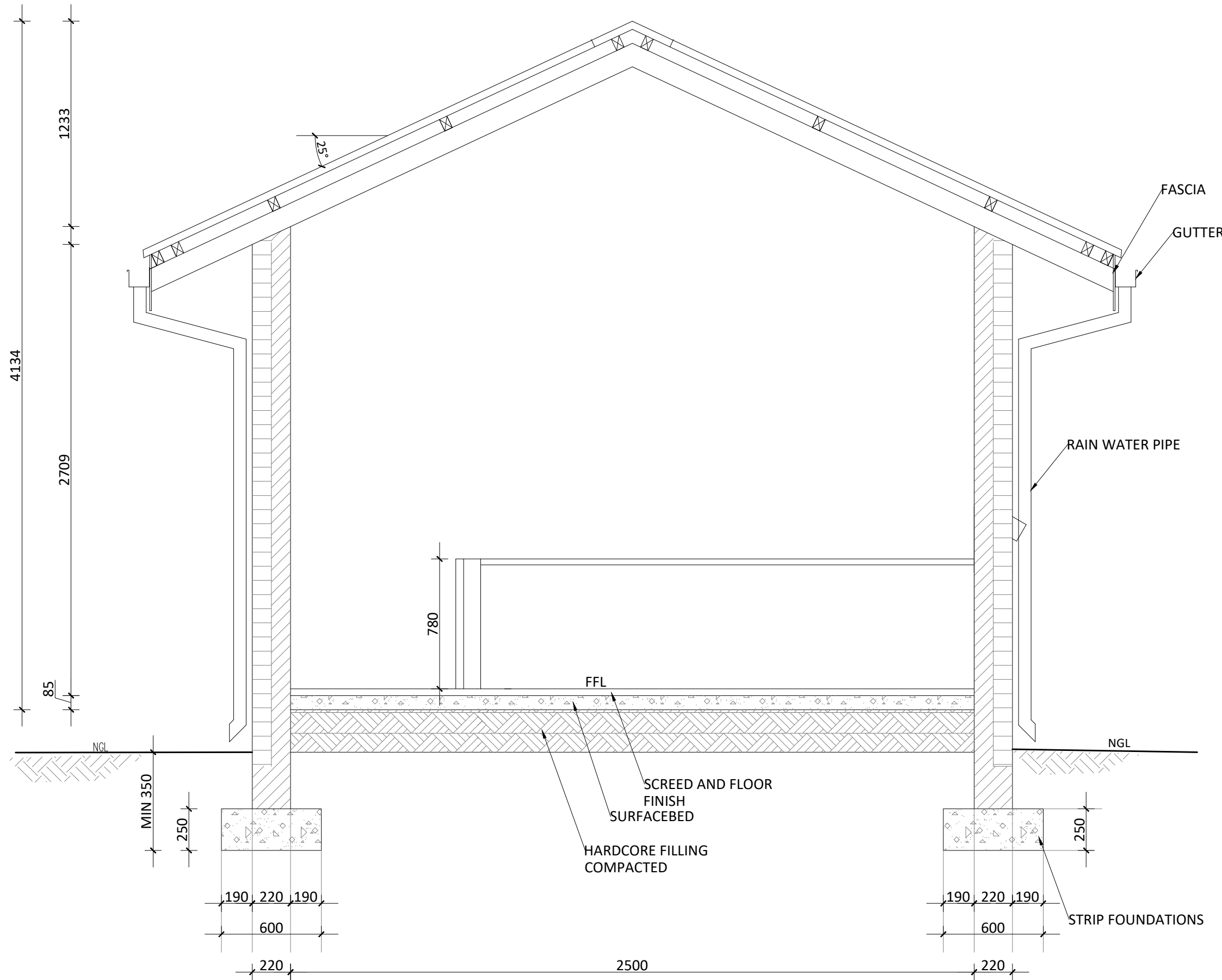
DRAWING No. 25007-03-H-07	SCALE 1:20
ORIGINAL SHEET SIZE A1	REVISION No. 1
CONTRACT No. VDM/TECH/17/03/2026/03	SHEET No. SHEET 1 OF 1

WINDOW SCHEDULE:

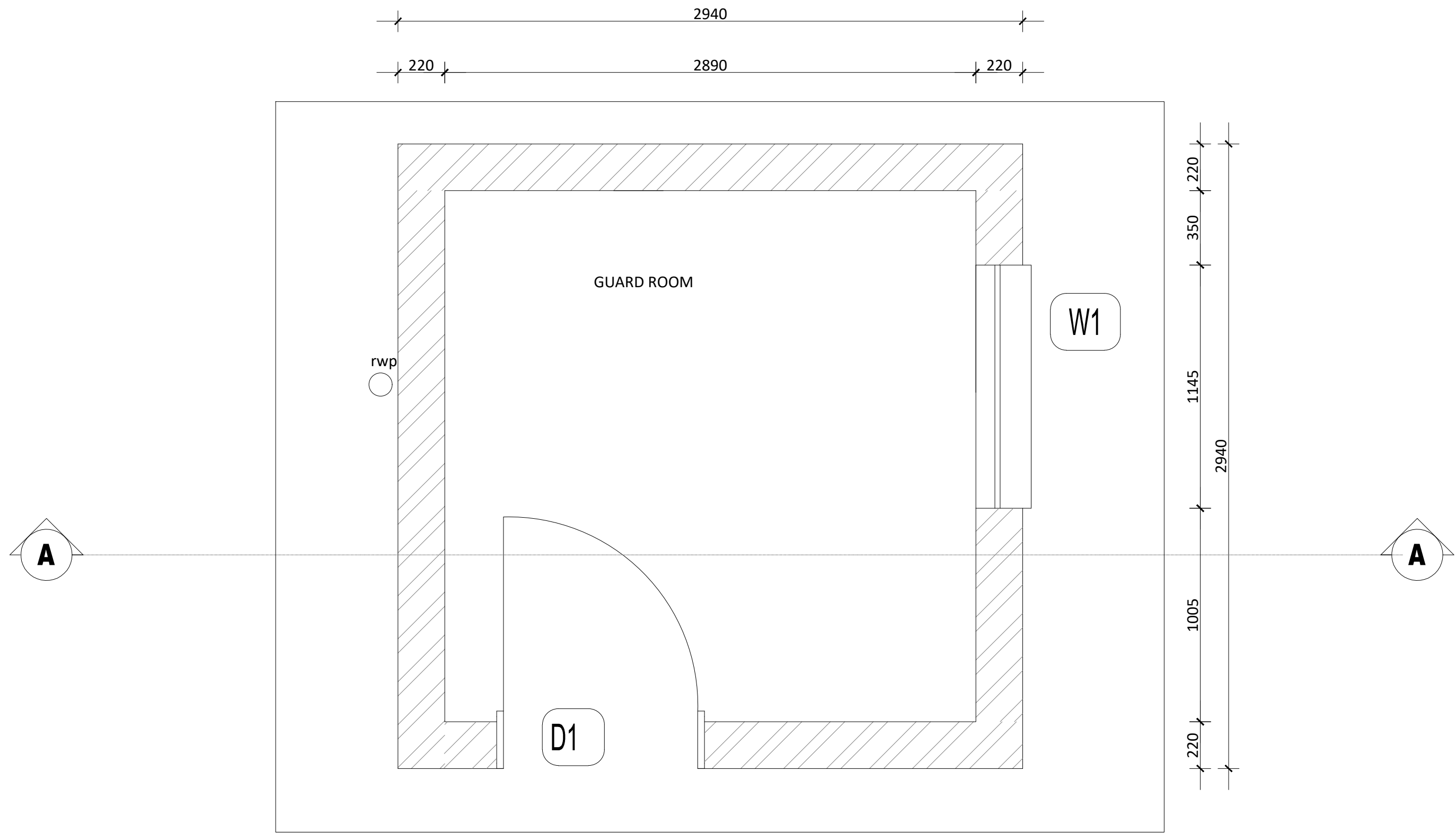
W1 - CAT. No.	: STANDARD MILDSTEEL RESIDENTIAL TYPE SIDE-HUNG MILDSTEEL WINDOW, CODE -WC1 SP (900 x 595)
GLAZING	: 4mm CLEAR FLOATED SHEET GLASS FIXED WITH GLAZING PUTTY PUTTY TO RECEIVE PAINT FINISH TO MATCH WINDOW FRAME.
FINISH	: CLEAN WITH STEEL BRUSH & APPLY 1 COAT DURAPHOS, 1 UNIVERSAL UNDERCOAT & TWO COATS GLOSS ENAMEL PAINT. COLOUR AS PER ARCHITECT.
No OF WINDOWS	: 1 (ONE)PROVIDE BURGLAR BARS OUT OF 12 x 12mm M/S SQUARE SOLID BARS TO LINE UP WITH VERTICAL & HORIZONTAL SECTIONS OF WINDOWS - FINISH DITTO FRAME
W2 - CAT. No.	: STANDARD MILDSTEEL RESIDENCIAL TYPE SIDE-HUNG MILDSTEEL WINDOW, CODE - WA2 SP LH/RH (1500 x 1145)
GLAZING	: 4mm CLEAR FLOATED SHEET GLASS FIXED WITH GLAZING PUTTY PUTTY TO RECEIVE PAINT FINISH TO MATCH WINDOW FRAME.
FINISH	: CLEAN WITH STEEL BRUSH & APPLY 1 COAT DURAPHOS, 1 UNIVERSAL UNDERCOAT & TWO COATS GLOSS ENAMEL PAINT. COLOUR AS PER ARCHITECT.
No of WINDOWS	: 2 (TWO)PROVIDE BURGLAR BARS OUT OF 12 x 12mm M/S SQUARE SOLID BARS TO LINE UP WITH VERTICAL & HORIZONTAL SECTIONS OF WINDOWS - FINISH DITTO FRAME

DOOR SCHEDULE:

DOOR	:813x2032x44mm SERVICE STEEL DOOR AND FRAME COMBO 813x2032x40mm INTERIOR MASONITE HARDBOARD DOOR & FRAME HINGES - 2x100mm M/S BUTTERFLY HINGES PER DOOR LEAF LOCKSET - "SOLID BLESBOK" 460/313 2-LEVER LOCKSET.
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SECTION A-A
SCALE 1:25



GUARDHOUSE LAYOUT
SCALE 1:25

GENERAL NOTES :

- * ALL DIMENSIONS AND LEVELS ARE TO BE VERIFIED ON SITE PRIOR TO COMMENCING SETTING OUT , WORKSHOP DRAWINGS OR CONSTRUCTION .
- * FIGURED DIMENSIONS ONLY TO BE USED .
- * DISCREPANCIES , ERRORS AND OMISSIONS ARE TO BE REPORTED TO ARCHITECTS IMMEDIATELY THEY BECOME EVIDENT .
- * SHOP DRAWINGS TO BE SUBMITTED FOR APPROVAL PRIOR TO MANUFACTURE OR INSTALLATION .
- * COPYRIGHT AND RIGHT OF REPRODUCTION OF THIS DRAWINGS OR ANY POTION THEREOF IS RESERVED MLA ARCHITECTS .

CONSTRUCTION NOTES

Foundations:

1. STRIP FOUNDATIONS - 700x250mm 15Mpa CONCRETE STRIP FOUNDATION. TOP OF FOUNDATION TO BE MIN 340mm BELOW N.G.L.
2. FILLING - APPROVED HARDCORE FILLING COMPACTED IN LAYERS OF MAX. 150mm. FILLING TO BE TREATED WITH SABS APPROVED INSECTICIDE AND WEED KILLER TO COMPLY WITH SABS 1164 & 1165.

Surfacebeds & floors:

1. SURFACEBED - 85mm THICK 15Mpa CONCRETE SURFACEBED ON USB GREEN 250 MIKRON DAMP PROOF MEMBRANE. SURFACEBED CAST IN SECTIONS OF MAX. 20sqm
2. SCREED & FLOOR FINISH - "Marley Super Metro" 2,5mm THICK FULLY FLEXIBLE VINYL FLOOR SHEETING ON 1:4 SMOOTH CEMENT SAND SCREED TO A TOTAL THICKNESS OF 30mm. ALL LAID AND FINISHED STRICTLY TO MANUFACTURERS SPEC.
3. SCREED & FLOOR FINISH - 30mm 1:4 CEMENT SAND SCREED TO RECEIVE "Marley" 2mm THICK FULLY FLEXABLE VINYL ASBESTOS FLOOR TILES, LAID STRICTLY TO MANUFACTURERS SPEC.

Skirtings:

1. SKIRTING - 70mm HIGH "MARLEY" RIDGED PVC SKIRTING SCREWED AND PLUGE TO WALL AT 450mm C/C.

Walls & Structure:

1. EXTERNAL WALLS - APPROVED FACEBRICK WALLS IN STRETCHERBOND TO RECEIVE 10mm WIDE x 6mm DEEP SQUARE RECCEDSED JOINTS IN BOTH DIRECTIONS.
2. BRICKFORCE: BRC BRICKFORCE TO 230 AND 115 WALLS FOUNDATION WALLS - EVERY 2ND COURSE, SUPERSTRUCTURE - EVERY 4TH COURSE. OVER OPENINGS FORMED IN BRICKWORK, EVERY COURSE FOR 4 COURSES EXTENDING 500mm BEYOND OPENING IN BOTH DIRECTIONS.
3. 228x76mm SAP BEAM TO BE BUILT IN & TIED DOWN TO FACEBRICK COLUMNS WITH 2,5mm GALVANISED WIRE TIES. BEAM TO BE CREOSOTE TREATED PRIOR TO BEING BUILT IN.
4. LINTEL - APPROVED FACEBRICK ON EDGE LINTOL OVER ALL WINDOW & DOOR OPENINGS BRICKWORK TO RECEIVE 10x6mm SQUARE RECESSED JOINTS.
5. D.P.C - PROVIDE 375 MIKRON DPC IN WALLS AT FLOOR LEVEL & UNDER ALL EXTERNAL WINDOW CILLS.
6. INTERNAL WALLS - APPROVED STOCKBRICK WALLS IN STRETCHERBOND TO RECEIVE 1 x COAT SMOOTH 1:5 CEMENT SAND PLASTER TO RECEIVE 1xMERIT UNIVERSAL UNDERCOAT AND TWO COATS PLASCON POLVIN SUPER ACRYLIC PVA.
7. WALL TILES - PROVIDE STANDARD 150x150mm WHITE GLAZED WALL TILES FROM FLOOR TO TOP OF WINDOW HIGHT(2295mm). TILES TO BE LAID WITH MANUFACTURERS APPROVED TILING ADHESIVE, AND WHITE TILING GROUT.

Window Sills:

1. INTERNAL WINDOW CILL - 15mm THICK FIBRE CEMENT WINDOW SILL BEDDED IN 1:4 CEMENT SAND MORTAR. SAND & APPLY ALKALI RESISTANT SEALER AND TWO COATS MAT ENAMEL PAINT.
2. EXTERNAL WINDOW CILL - APPROVED FACEBRICK ON EDGE, TO MATCH WALLS. JOINTS TO BE SQUARE & RECESSED.

Roof & Facia:

1. ROOF SHEETING - 0,6mm "KLIPOK" ROOF SHEETING IN CHROMADECK FINISH ON 76x50mm SAP PURLINS AT MAX. 1200mm C/C ON PATTENT & APPROVED PRE-FABRICATED ROOF TRUSS SYSTEM.
2. RIDGE CAPING - STANDARD FACTORY MANYFACTURED RIDGES AND FLASHINGS IN FINISH TO MATCH ROOF COVERING.
3. FACIA & GUTTERS - 250x10mm THICK FC77 PRESSED FIBRE CEMENT FACIA, SCREW FIXED TO TRUSS ENDS & COUNTER BATTEN WITH COUNTERSUNK BRASS SCREWS. PREPARE & APPLY ONE UNIVERSAL UNDERCOAT & TWO COATS PLASCON POLVIN SUPER ACRYLIC P.V.A PAINT
100 x 100 x 0,6mm GUTTERS WITH 100mm DIA RAINWATER DOWNPIPES WITH CHROMADEK FINISH.
4. TRUSS SYSTEM: TIMBER PATENT & APPROVED PRE-FABRICATED SYSTEM AT 1200mm C/C MAX. PURLINS 50 x 76mm SA PINE AT 1400mm C/C MAX. WALL PLATE 114 x 38mm SA PINE TO BE CREOSOTE TREATED BEFORE FIXING. CERTIFICATE & GUARANTEE FOR DESIGN & ERECTION TO BE SUPPLIED BY TRUSS MANUFACTURER. ALL EXPOSED TIMBER SECTIONS AS WELL AS SECTIONS IN CONTACT WITH WET TRADES TO BE CREOSOTE TREATED BEFORE FIXING INTO POSITION. TRUSS TO BE SECURED TO WALLS AT WALLPLATE WITH 2,5mm GALV. STEEL WIRE TIES, BUILT INTO WALLS MIN 6 BRICK COURSES.

0	03/2026	FOR TENDER		J.M	
No	DATE			CONSULT	DIR

NOTES

DESIGNED BY	T.M
CHECKED BY	F.M
DRAWN BY	T.S
CHECKED BY	F.M
APPROVED BY	ALEX CHIUSWA
SIGNATURE	

CLIENT



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PROJECT NAME	REFURBISHMENT OF HARPER WWTP
DRAWING TITLE	GUARD HOUSE

DRAWING No. 25007-03-H-08	SCALE AS SHOWN
	REVISION No. 0
CONTRACT No. VDM/TECH/17/03/2026/03	SHEET No. SHEET 1 OF 1

NOTES

1. PRE - FABRICATED CONCRETE ELEMENTS.

1.1. WORKMANSHIP AND FINISH IN GENERAL:
ALL CONCRETE ELEMENTS SHALL BE MANUFACTURED FROM SOUND CONCRETE, FREE OF STRUCTURAL DEFECTS, COMPLYING WITH ANY SAMPLE IF PREVIOUSLY SUBMITTED. ALL ELEMENTS SHALL HAVE OFF-SHUTTER FINISH ON THREE SIDES, WITH THE FOURTH SIDE HAVING A WOOD FLOATED FINISH.

1.2. SHAPE & DIMENSION:
ALL ELEMENTS SHALL RETAIN THE REQUIRED SHAPE AND BE TRUE TO THE RESPECTIVE AND SPECIFIED DIMENSIONS AS INDICATED IN 2.1, 3.1 AND 4.1.

1.3. PERFORMANCE REQUIREMENTS (STRENGTH):
THE REQUIRED CONCRETE COMPRESSIVE STRENGTH IN ALL PRE-FABRICATED PRE-STRESSED ELEMENTS SHALL BE A MINIMUM OF 30MPa AT 28 DAYS, DETERMINED IN ACCORDANCE WITH SABS METHOD 863.

1.4. CURING:
ALL CONCRETE ELEMENTS SHALL BE CURED IN ACCORDANCE WITH THE RECOMMENDATIONS GIVEN IN SABS METHOD 863.

1.5. REINFORCEMENT:
ALL STEEL USED FOR REINFORCEMENTS IN PRE-FABRICATED ELEMENTS SHALL BE HIGH YIELD STEEL WITH A MINIMUM CHARACTERISTIC STRENGTH OF 410 MPa, AND SHALL BE FREE OF RUST, LOOSE SCALE, FLUX, GREASE OR OIL SUBSTANCES AND SHALL IN GENERAL COMPLY WITH SABS 920 AND BS 4482.

1.6. PRE-STRESSING STEEL:
ALL WIRES SHALL BE OF THE CRIMPED VARIETY AND SHALL BE FREE OF RUST, LOOSE SCALE, FLUX, GREASE OR OIL SUBSTANCES AND SHALL IN GENERAL COMPLY WITH SABS 920 AND BS 5896.

2. POST:

2.1. THE POST SHALL BE 3.0m LONG AND SLOTTED, AS PER DRAWING, TO TAKE THE HORIZONTAL LOAD BEARING RAILS. THE FRONT EDGE SHALL BE CURVED. THE BACK SECTION SHALL BE 140mm WIDE TAPERING TO THE FRONT TO 80mm. THE THICKNESS OF THE POST SHALL BE 225mm. POSTS SHALL BE SPACED AT 2.0m CENTRE.

2.2. THE POSTS SHALL BE PRE-STRESSED WITH 4x4mm WIRE GRADED 1550/1700MPa, STRESSED TO 75% OF THE U.T.S. (ULTIMATE TENSILE STRENGTH) PRE-STRESSED WIRES SHALL BE CUT AT THE SURFACE LEVEL AND SEALED. THE TOP OF THE POST SHALL BE ANGLED AT 45deg.

3. RAILS:

3.1. THE RAILS SHALL BE 1.98m LONG WITH NINEx10mm HOLES TO TAKE CARRIAGE 8mm TYPE BOLTS. THE RAILS SHALL BE 150mm WIDE AND 80mm DEEP. ALL RAILS SHALL BE 150mm WIDE AND 80mm DEEP. ALL RAILS ARE TO BE GROUTED INTO POSTS.

3.2. THE RAILS SHALL BE PRE-STRESSED WITH FOUR 4mm WIRES GRADED 1550/1700 MPa, STRESSED TO 75% OF THE U.T.S. (ULTIMATE TENSILE STRENGTH) PRE-STRESSED WIRES SHALL BE CUT AT SURFACE LEVEL.

4. BOLTS:

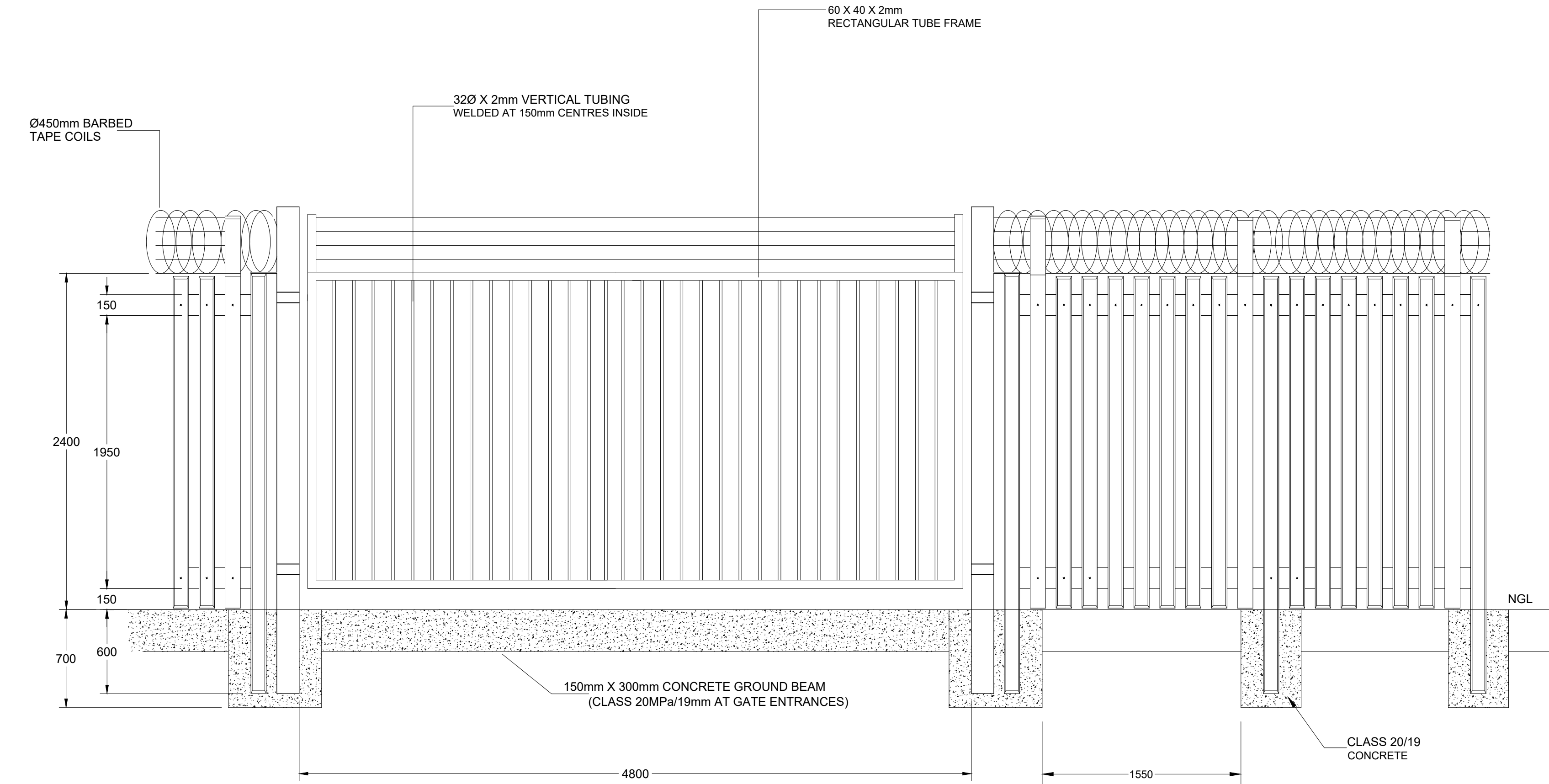
4.1. ALL BOLTS USED FOR THE ERECTION OF THE FENCE SHALL BE ELECTRO-GALVANISED (ZINC AND CHROME PASSIVATED).

5. ERECTION:

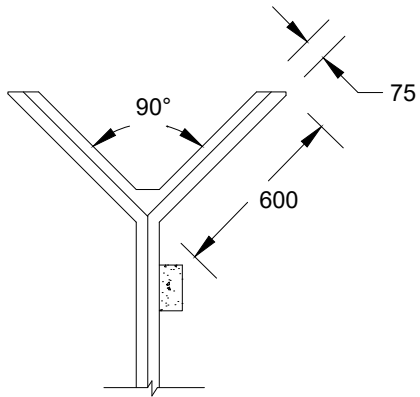
5.1. EACH POST SHALL BE EMBEDDED TO FULL DPTH IN CONCRETE IN A FOUNDATION HOLE OF AT LEAST 460mm x 460mm AND A DEPTH OF 600mm.

5.2. THE SIZES SPECIFIED IN par.6.1 ARE FOR FIRM SOILS AND IT MAY BE NECESSARY TO INCREASE THESE SIZES FOR SOFTER YIELDING SOILS.

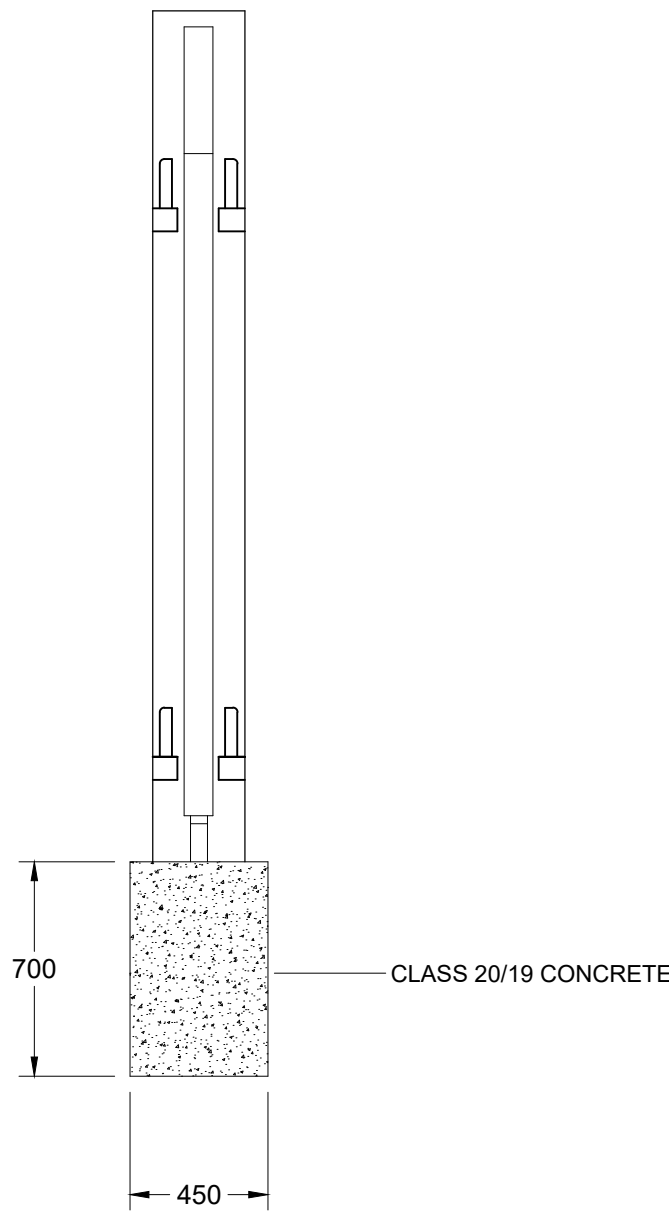
5.3. FOUNDATION SHALL BE A MINIMUM OF 10MPa AT 28 DAYS.



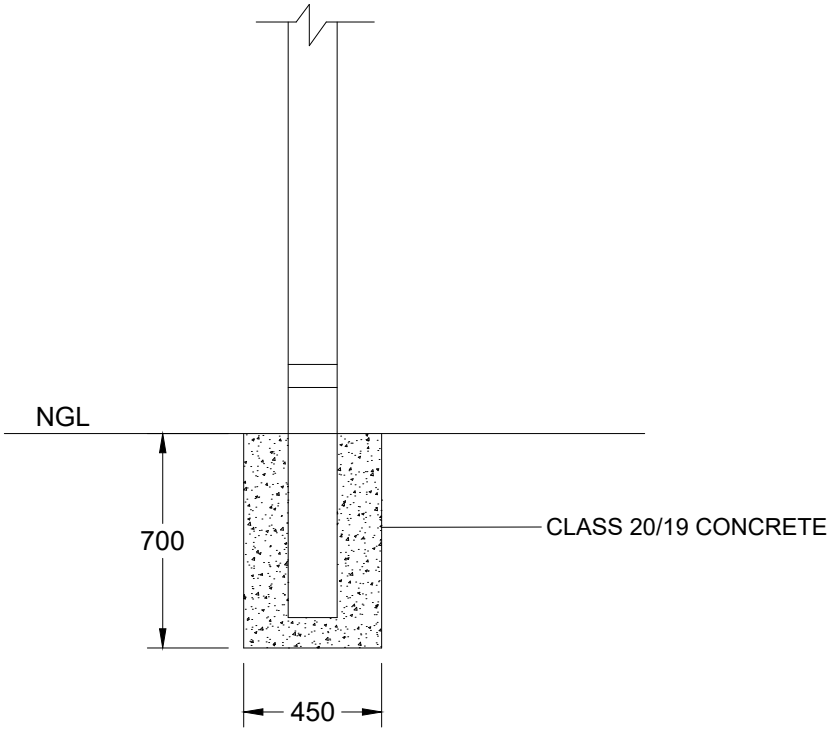
ELEVATION PALISADE FENCE & SLIDING GATE
SCALE 1:25



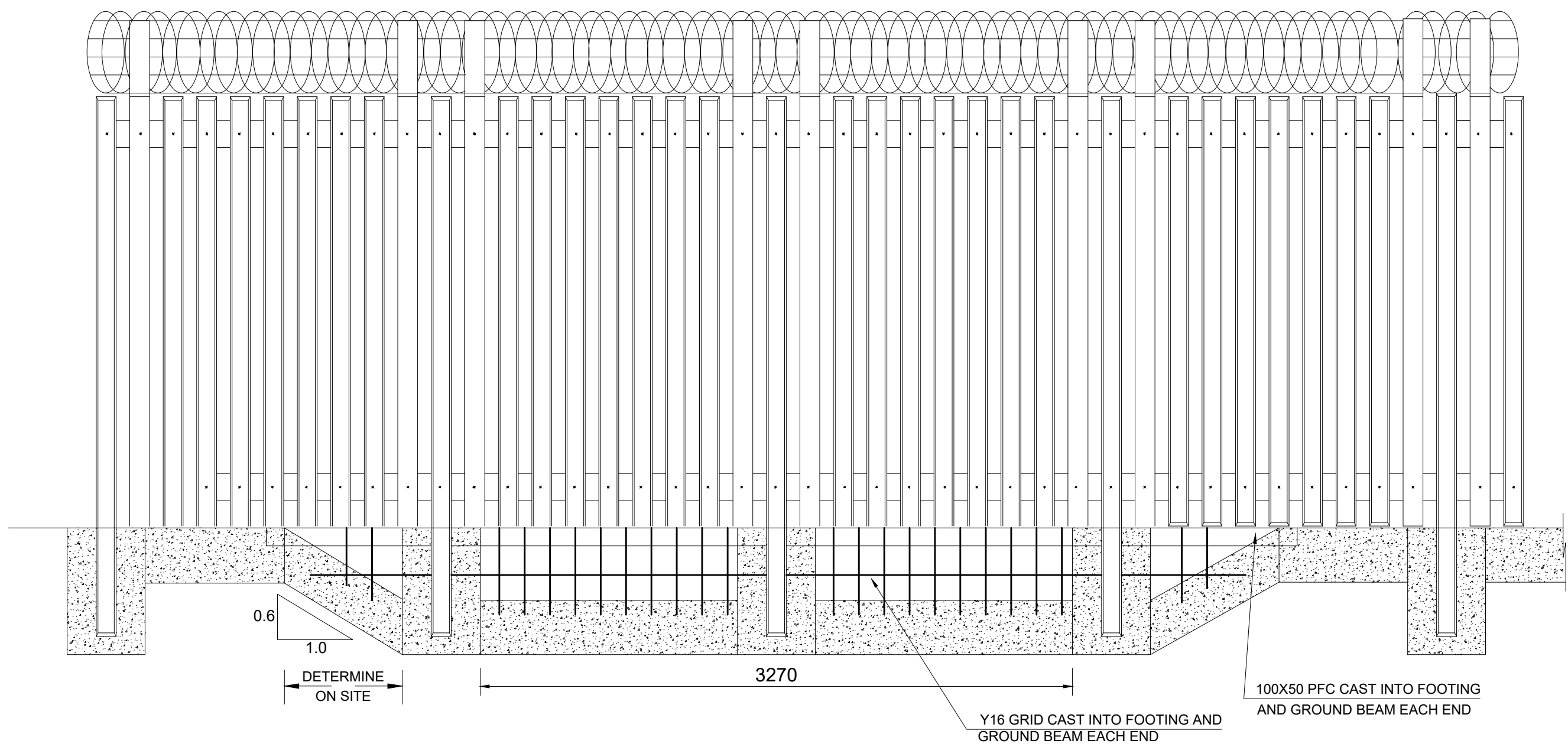
CONCRETE OVERHANG BRACKET
SCALE 1:25



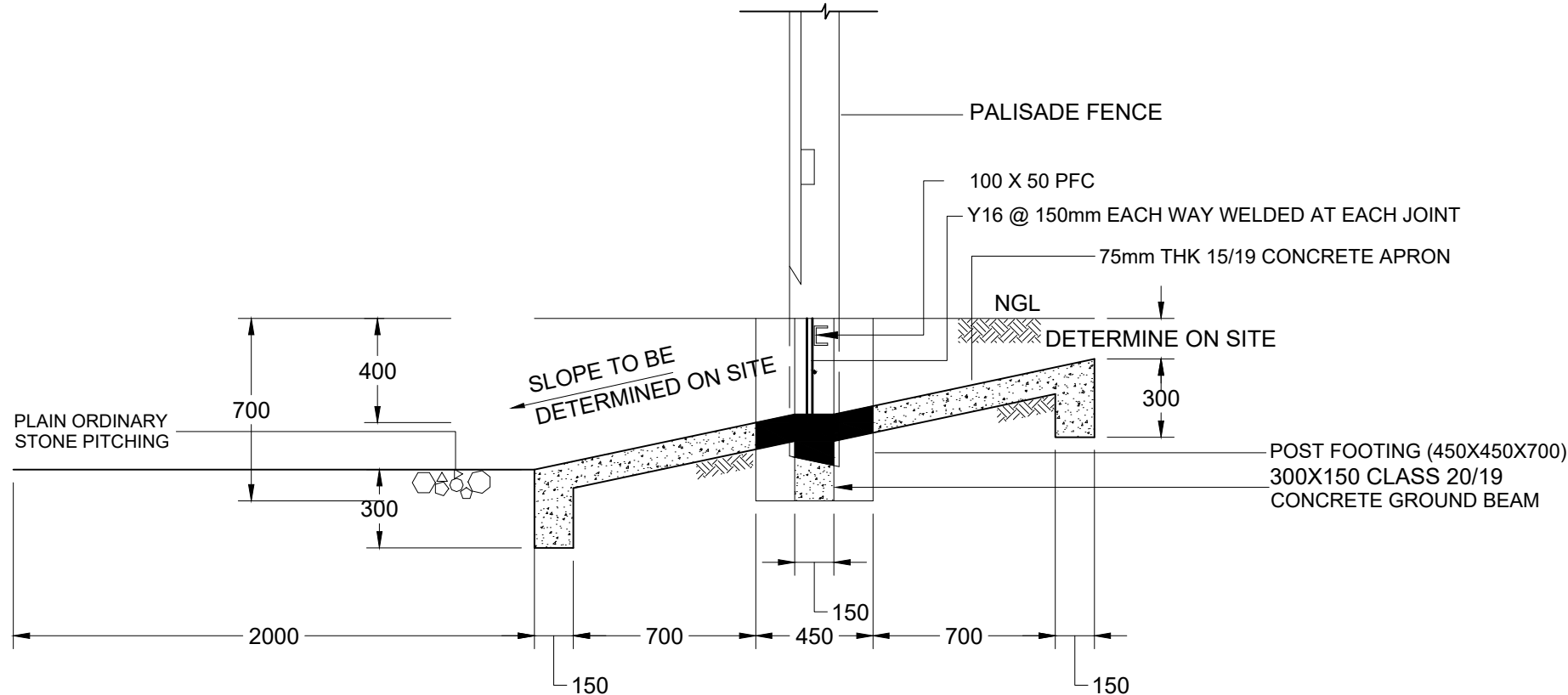
SECTION THROUGH GATE POST
SCALE 1:25



POST DETAIL
SCALE 1:25



TYPICAL SECTION
SCALE 1:25



TYPICAL SECTION
SCALE 1:25

0	02/2026	FOR TENDER	J.M		
No	DATE		CONSULT	DIR	

NOTES	

DESIGNED BY	F.M
CHECKED BY	A.C
DRAWN BY	D.M
CHECKED BY	J.M
APPROVED BY	ALEX CHIUSWA
SIGNATURE	

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PROJECT NAME	REFURBISHMENT OF HARPER SEWAGE BOOSTER PUMP STATION
DRAWING TITLE	CONCRETE PALLISADE FENCE DETAILS

DRAWING No. 25007- 03 - H - 09	SCALE 1:25
	REVISION No. 0
CONTRACT No. VDM/TECH/17/03/2026/03	SHEET No. SHEET 1 OF 1