



**DEPARTMENT**  
**Technical Services**  
**DIRECTORATE**  
**Water Services**  
**DIVISION**

**Water and Sanitation Engineering**

**PROCUREMENT DOCUMENT : INFRASTRUCTURE (SAICE GCC)**

Documents are to be obtained, free of charge, in electronic format, from the [National Treasury's eTenders website](#) or the [eThekweni Municipality website](#)

**Contract No:** 32269-5W

**Contract Title:** Trenance 3 Reservoir: The Construction of a 6 Ml Reinforced Concrete Reservoir, Pump Station, Inlet & Outlet Pipework, 400 Kl Elevated Tank and Ancillary Works: Ward 59

**Est. CIDB Grade/ Class:** 7 CE

**CLARIFICATION MEETING AND QUERIES**

**Clarification Meeting:** Compulsory Clarification Meeting

**Meeting Location, Date, Time:** Trenance 3 Reservoir Site, 207 Madrona Dr, Trenance Park, Amaotana 4068. On the 13 October 2025 at 10h00.  
Co-ordinates: 29°39'7.86"S, 30° 59'47.17"E

**Technical Queries can be addressed to The Employer's Agent's Representative:**

Devesh Ramghulam  
Tel: 031-265-6007  
eMail: [Devesh.Ramghulam@naiduconsulting.com](mailto:Devesh.Ramghulam@naiduconsulting.com)

**Contractual Queries can be addressed to:**

Sivashan Pillay  
Tel: 031-322-2636  
eMail: [Sivashan.Pillay@durban.gov.za](mailto:Sivashan.Pillay@durban.gov.za). All email queries must be submitted by 23 October 2025 and consolidated questions and answers to be uploaded on the website on 30 October 2025.

**TENDER SUBMISSION**

The Tender Offer (hard copy) shall be delivered to:

**Delivery location:** The Tender Box in the foyer of the Municipal Building, 166 KE Masinga Road, Durban

Tenderers are to also make an **electronic submission** via the eThekweni Municipality **JDE System (SSS Module)** (see Tender Data: C.2.13).

**JDE Queries Contact:**

Lindo Dlamini: Tel: 031-322-7133 / 031-322-7153  
Email: [supplier.selfservice@durban.gov.za](mailto:supplier.selfservice@durban.gov.za)

**Closing Date/ Time:** Friday, 07 November 2025 at 11h00

**Tender Offers submitted via any means other than that stated in the Tender Data will be deemed invalid**

**Issued by:**

ETHEKWINI MUNICIPALITY

Deputy Director: [Water and Sanitation Engineering](#)

Date of Issue: 03/10/2025

Document Version 01/07/2025

**FOR OFFICIAL USE ONLY**

Tenderer Name:			VAT Registered: Yes No
	Price (excl)	VAT	Price (incl)
Submitted: R	R		R
Corrected: R	R		R

FOR OFFICIAL USE ONLY

Tenderer Name:			VAT Registered: Yes No
	Price (excl)	VAT	Price (incl)
Submitted: R		R	R
Corrected: R		R	R

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## **PART T1: TENDERING PROCEDURES**

### **T1.1.1: TENDER NOTICE AND INVITATION TO TENDER**

Tenders are hereby invited for the works for: The Construction of a 6 Ml Reinforced Concrete Reservoir, Pump Station, Inlet & Outlet Pipework, 400 Kl Elevated Tank and Ancillary Works: Ward 59.

Subject	Description	Tender Data
<b>Employer</b>	The Employer is the eThekweni Municipality as represented by: Deputy Director: <b>Water and Sanitation Engineering</b>	C.1.1.1
<b>Tender Documents</b>	Documentation is to be downloaded from the <b>National Treasury's eTenders website</b> or the <b>eThekweni Municipality Website</b> : <ul style="list-style-type: none"> <li>• <a href="https://www.etenders.gov.za/">https://www.etenders.gov.za/</a></li> <li>• <a href="https://www.durban.gov.za/pages/business/procurement">https://www.durban.gov.za/pages/business/procurement</a></li> </ul>	C.1.2
<b>CIDB Eligibility</b>	It is <u>estimated</u> that Tenderers should have a CIDB contractor grading designation of <b>7 CE</b> (or higher).	C.2.1.2
<b>Clarification Meeting</b>	<b>Trenance 3 Reservoir Site, 207 Madrona Dr, Trenance Park, Amaotana 4068. On the 13 October 2025 at 10h00.</b> <b>Co-ordinates: 29°39'7.86"S, 30° 59'47.17"E</b>	C.2.7
<b>Seek Clarification</b>	Contractual Queries can be addressed to: <b>Sivashan Pillay</b> <b>Tel: 031-322-2636</b> <b>eMail: Sivashan.Pillay@durban.gov.za</b>  Technical Queries relating to these documents are to be addressed to the Employer's Agent's Representative whose contact details are: <b>Devesh Ramghulam</b> <b>Tel: 031-265-6007</b> <b>eMail: Devesh.Ramghulam@naiduconsulting.com</b>	C.1.4
<b>Submitting a Tender Offer</b>	The Tender Offer (hard copy) shall be delivered to: <b>The Tender Box in the foyer of the Municipal Building, 166 KE Masinga Road, Durban</b>  An <b>electronic submission</b> , via the eThekweni Municipality <b>JDE System (SSS Module)</b> , is also to be made. Refer to Part T1.1.2 and Tender Data: C.2.13. Notwithstanding the <b>electronic submission</b> , a tender offer will only be deemed valid if the "hard copy" submission has been made.	C.2.13
<b>Closing Time</b>	The Tender Offer (hard copy) shall be delivered, and the electronic submission completed, both on or before <b>Friday, 07 November 2025</b> , at or before <b>11h00</b> .	C.2.15
<b>Evaluation of Tender Offers</b>	<b>The 80/20</b> Price Preference Point System, as specified in the <b>SCM Policy: Section 52: Preferential Procurement</b> will be applied in the evaluation of tenders. <b>Tender Data: C.3.11: Evaluation of Tender Offers</b> details the awarding of Preference Points, and other related evaluation requirements.	C.3.11
Requirements for sealing, addressing, delivery, opening, and assessment of tenders are stated in the Tender Data		

#### **Applicable CIDB B.U.I.L.D. Programme Standards**

CIDB Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts	Yes
CIDB Standard for Developing Skills through Infrastructure Contracts	No

## **T1.1.2: INFORMATION REGARDING THE ETHEKWINI JDE SYSTEM**

This Part (T1.1.2) is for information purposes only. Compliance requirements are stated in **Part T1.2: Tender Data**.

### **1) General**

eThekwini Municipality Bids, Tenders and Quotations (hereafter referred to as Tenders) are going to be submitted using the JDE System.

This JDE System will be used for:

- Viewing of available (open) Tenders,
- Downloading procurement documentation for Tenders,
- Uploading completed and signed Tender documentation,
- Completion and submission of Tenders electronically,
- Viewing the Tender opening schedule.

### **2) Registrations**

To be granted access to the **JDE System** prospective service providers must be registered on the **National Treasury's Central Supplier Database (CSD)**, the **eThekwini Municipality Supplier Portal**, and the **eThekwini Municipality JDE System**.

#### **National Treasury: Central Supplier Database**

- Registration can be made on <https://secure.csd.gov.za>.
- Service Providers will be issued a "MAAA" number when registered.

#### **eThekwini Municipality Supplier Portal**

- Registration can be made on <https://www.durban.gov.za> by following these links:  
>Business >Supply Chain Management (SCM) >Accredited Supplier & Contractor Database.

#### **eThekwini Municipality JDE System**

- Service providers requiring access must send an email to [supplier.selfservice@durban.gov.za](mailto:supplier.selfservice@durban.gov.za)  
The following information is required:
  - Copy of the **Director's ID**.
- On receipt of this email, the Procurement and Supply Chain Management (P&SCM) Directorate will respond with the login credentials and a link to the **JDE System**.

### **3) Assistance with using the JDE System**

The following P&SCM Official(s) can be contacted in connection with any queries regarding the use of the **JDE System**:

- Lindo Dlamini      Tel:            031 322 7153 or 031 322 7133  
                                 Email:        [supplier.selfservice@durban.gov.za](mailto:supplier.selfservice@durban.gov.za)

### **4) Viewing of available tenders**

By following link <https://rfq.durban.gov.za/jde/E1Menu.maf> prospective Service Providers will be able to view available (open) Tender opportunities without signing into the system. However, Service Providers will not be able to respond to a Tender without being signed into the system using a JDE User ID and Password.

**5) Tender documentation**

By accessing the **JDE System** (using <https://rfq.durban.gov.za/>) and viewing any available Tenders, prospective Service Providers will be able to download the relevant Tender documentation.

The Tender documentation consists of the **TENDER** and **CONTRACT Parts**, as described in the INDEX, and will include any drawings and other information (if applicable). Referred to or included in the documentation are the **Standard Conditions of Tender (and associated Tender Data)**, and the **Conditions of Contract (and associated Contract Data)** which will govern the tendering and contract processes respectively.

**6) Submission of tender offers**

Reference is to be made to the **Tender Data: C.2.13** that specifies compliance requirements.

**Tender Offers** are to be delivered, in “hard copy” format, to the Delivery Location as stated in the **Tender Data**.

In addition to the above, **Tender Offers are also to be SUBMITTED ELECTRONICALLY** (uploaded) on the eThekweni Municipality JDE System (Supplier Self Service (JDE-SSS) Module). Notwithstanding the **electronic submission**, a tender offer will only be deemed valid if the “hard copy” submission has been made. The “hard copy” submission will be deemed to be the ruling version.

Bidders are responsible for resolving all access rights and submission queries on the JDE System before the tender closing date/ time, as stated in the **Tender Data: C.2.15**.

**7) Viewing the Tender opening schedule**

Users on the **JDE System** will be able to view the **Tender Opening Schedule** for each closed Tender. The tender opening schedule will also be made available on the eThekweni Municipal website at URL: <https://www.durban.gov.za/pages/business/publication-of-received-bids>

### **T1.1.3: NOTES TO TENDERERS**

These “**Notes to Tenderers**” are intended to provide guidance to Tenderers regarding tendering obligations and requirements. Compliance requirements are stated in the relevant parts of the **Tender Data: T1.2**.

#### **eThekwini Supply Chain Management Policy (SCMP)**

The requirements as stated in the Employer’s SCM Policy include, but are not limited to, the following:

##### **1) Section 14(4): ETM Supplier Database**

The eThekwini Supply Chain Management Policy requires suppliers/ service providers/ contractors to be registered on the eThekwini Municipality’s Vendor Portal.

In the event of the Tenderer not being registered on the eThekwini Municipality’s Supplier Portal, the Tenderer must register on the internet at [www.durban.gov.za](http://www.durban.gov.za) by following these links:

- Business
- Supply Chain Management (SCM)
- Accredited Supplier and Contractor’s Database.

The following is to be noted:

- The information for registration as in the possession of the eThekwini Municipality will apply.
- It is the Tenderer’s responsibility to ensure that the details submitted to the Municipality are correct.
- Tenderers are to register prior to the submission of tenders.

##### **2) Section 20(1)(d)(i): Audited Financial Statements**

Audited Financial Statements are required to be submitted if the value of the tender offer exceeds R10 million (incl. VAT). See **Returnable Form: MBD 5** and **Returnable Form: Contracts awarded by Organs of State** in the past 5 years.

##### **3) Section 20(1)(d)(iii): Contracts Awarded during the past 5 Years**

Tenderers are to include with their submission a listing of any contracts awarded to the Tenderer during the past 5 years, including particulars of any material non-compliance or dispute concerning the execution of the contracts. Tenderers are referred to **Returnable Form: MBD 5**

##### **4) Section 13.1(b)(vii), 20(1)(d)(ii), 28.2(d), 29.6(a), 38.1(d), and 29.14: Municipal Rates and Taxes (Fees)**

Tenderers are to refer to **Returnable Form: Declaration of Municipal Fees** to certify that they have no undisputed commitments for municipal services towards any municipality. Prior to an award, a Tenderer’s municipal rates and taxes cannot be in arrears. Should a Tenderer be in arrears with respect to municipal services and has formalised an agreement with the respective municipality to offset the arrears, the agreement must be in place at time of tender closing.

##### **5) Section 21.2: Tender Validity**

Tenders are to remain valid for twelve (12) months after the expiry of the original tender validity period unless the Municipality is notified, in writing, of anything to the contrary.

**6) Section 28(2)(d), Section 28(2)(h) and Section use 29(12): Certifications and Registrations**

CIDB Registration and Status, B-BBEE Certificates, and Tax Compliance Status PINs must be valid at tender closing, and before final award.

The Tenderer's Tax Compliance Status, CIDB Registration and Status (if required), and B-BBEE Level Status (if required), will be verified using the National Treasury Central Supplier Database (CSD). Tenderers are referred to **Returnable Form: Compulsory Enterprise Questionnaire**.

It is the Tenderer's responsibility to ensure that their data on the CSD is kept updated and correctly reflects the status of the tendering entity.

**7) Section 28(2)(f), and 52.5.13: Joint Ventures (JV)**

Each party of a JV must submit separate Tax Compliance Status PINs.

Also, and unless otherwise stated, the requirements for a single entity submission in terms of documentation requirements, will apply to each member of a JV making a submission.

As proof that a JV has been formalised, or that the parties to the JV agree to formalise the JV should they be successful in being recommended for the award of this tender, Tenderers are referred to **Returnable Form: Joint Venture Agreements**.

**8) Section 49.1.2: Complaints and Objections (Appeals)**

A non-refundable tariff, as per the approved Council tariffs, is payable by the Complainant to the Municipality. Proof of the payment of the Fee must be attached to the Complaint.

**CIDB****Regulation 25(8)**

- 9) It should be noted that this contract is not part of a **Targeted Development Programme (TDP)**. The CIDB provisions in relation to a Contractor's **Potentially Emerging (PE) status** do not apply.

Tenderers are referred to **CIDB Inform Practice Note #32: "Application of the Potentially Emerging (PE) Status"**.

**B.U.I.L.D. Programme**

- 10) A programme to accelerate transformation in the construction industry, increase the capacity of the construction industry to deliver infrastructure and support the growth of emerging contractors, was launched on 14 March 2024 by the Deputy Minister of Public Works and Infrastructure and the Construction Industry Development Board.

Details of the B.U.I.L.D. Programme were published in a Government Gazette in 2020 (GG 43726) and B.U.I.L.D. has gradually been phased in at various levels of government and the private sector. The CIDB, a public entity with the mandate to promote improved performance in construction, oversees the programme and manages the B.U.I.L.D Fund.

The B.U.I.L.D programme determines that public sector entities which implement construction projects, that meet certain minimum requirements, must include developmental goals to the deliverables defined in the tenders. Contractors are required to include these goals in the plans and pricing when they submit their tender bids.

## **PART T1: TENDERING PROCEDURES**

### **T1.2: TENDER DATA**

#### **T1.2.1 STANDARD CONDITIONS OF TENDER**

The conditions of tender are the **Standard Conditions of Tender** as contained in **Annex C** of the CIDB Standard for Uniformity in Construction Procurement as published in Government Gazette No 42622, Board Notice 423 of 8 August 2019, as duplicated below.

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.

### **Annex C**

## **Standard Conditions of Tender**

#### **C.1 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 required for tender evaluation purposes, shall form part of any contract arising from the invitation to tender.

<p>C.1.3.3 For the purposes of these conditions of tender, the following definitions apply:</p> <p>a) <b>conflict of interest</b> means any situation in which:</p> <ul style="list-style-type: none"> <li>i) someone in a position of trust has competing professional or personal interests which make it difficult to fulfil his or her duties impartially;</li> <li>ii) 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</li> <li>iii) incompatibility or contradictory interests exist between an employee and the tenderer who employs that employee.</li> </ul> <p>b) <b>comparative offer</b> means the price after the factors of a non-firm price and all unconditional <b>discounts</b> it can be utilised to have been taken into consideration;</p> <p>c) <b>corrupt practice</b> 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;</p> <p>d) <b>fraudulent practice</b> 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;</p>	<ul style="list-style-type: none"> <li>c) no acceptable tenders are received;</li> <li>d) there is a material irregularity in the tender process.</li> </ul>
<p><b>C.1.4 Communication and employer's agent</b></p> <p>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 readily read, copied and recorded. Communications 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 <b>Tender Data</b>.</p>	<p>C.1.5.2 The decision to cancel a tender invitation must be published in the same manner in which the <i>original</i> tender invitation was advertised.</p>
<p><b>C.1.5 Cancellation and Re-Invitation of Tenders</b></p> <p>C.1.5.1 An employer may, prior to the award of the tender, cancel a tender if-</p> <ul style="list-style-type: none"> <li>a) due to changed circumstances, there is no longer a need for the engineering and construction works specified in the invitation;</li> <li>b) funds are no longer available to cover the total envisaged expenditure;</li> </ul>	<p>C.1.5.3 An employer may only with the prior approval of the relevant treasury cancel a tender invitation for the second time.</p> <p><b>C.1.6 Procurement procedures</b></p> <p><b>C.1.6.1 General</b></p> <p>Unless otherwise stated in the <b>Tender Data</b>, a contract will, subject to C.3.13, be concluded with the tenderer who in terms of C.3.11 is the highest ranked or the tenderer scoring the highest number of tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders.</p> <p><b>C.1.6.2 Competitive negotiation procedure</b></p> <p>C.1.6.2.1 Where the <b>Tender Data</b> require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of C.3.4, the employer shall announce only the names of the tenderers who make a submission. The requirements of C.8 relating to the material deviations or qualifications which affect the competitive position of tenderers shall not apply.</p> <p>C.1.6.2.2 All responsive tenderers or at least a minimum of not less than three responsive tenderers that are highest ranked in terms of the evaluation criteria stated in the <b>Tender Data</b> shall be invited to enter into competitive negotiations based on the principle of equal treatment, keeping confidential the proposed solutions and associated information.</p> <p>Notwithstanding the provisions of C.2.17, the employer may request that tenders be clarified, specified and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning or additional information does not alter any fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.</p>

C.1.6.2.3 At the conclusion of each round of negotiations, tenderers shall be invited by the employer to revise their tender offer based on the same evaluation criteria, with or without adjusted weightings. Tenderers shall be advised when they are to submit their best and final offer.	submit a tender offer and obtain the employer's written approval to do so prior to the closing time for tenders.
C.1.6.2.4 The contract shall be awarded in accordance with the provisions of C.3.11 and C.3.13 after tenderers have been requested to submit their best and final offer.	<b>C.2.2 Cost of tendering</b>
<b>C.1.6.3 Proposal procedure using the two stage-system</b>	C.2.2.1 Accept that, unless otherwise stated in the <b>Tender Data</b> , 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 complies with requirements.
<b>C.1.6.3.1 Option 1</b>	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.
Tenderers shall in the first stage submit technical proposals and, if required, cost parameters around which a contract may be negotiated. The employer shall evaluate each responsive submission in terms of the method of evaluation stated in the <b>Tender Data</b> , and in the second stage negotiate a contract with the tenderer scoring the highest number of evaluation points and award the contract in terms of these conditions of tender.	<b>C.2.3 Check documents</b>
<b>C.1.6.3.2 Option 2</b>	Check the tender documents on receipt for completeness and notify the employer of any discrepancy or omission.
C.1.6.3.2.1 Tenderers shall submit in the first stage only technical proposals. The employer shall invite all responsive tenderers to submit tender offers in the second stage, following the issuing of procurement documents.	<b>C.2.4 Confidentiality and copyright of documents</b>
C.1.6.3.2.2 The employer shall evaluate tenders received during the second stage, in terms of the method of evaluation stated in the <b>Tender Data</b> , and award the contract in terms of these conditions of tender.	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.
<b>C.2 Tenderer's obligations</b>	<b>C.2.5 Reference documents</b>
<b>C.2.1 Eligibility</b>	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.2.1.1 Submit a tender offer only if the tenderer satisfies the criteria stated in the <b>Tender Data</b> and the tenderer, or any of his principals, is not under any restriction to do business with employer.	<b>C.2.6 Acknowledge addenda</b>
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	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 <b>Tender Data</b> , in order to take the addenda into account.
	<b>C.2.7 Clarification meeting</b>
	Attend, where required, a clarification meeting at which tenderers may familiarize themselves

<p>with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the <b><i>Tender Data</i></b>.</p>	<p><b>C.2.12 Alternative tender offers</b></p>
<p><b>C.2.8 Seek clarification</b></p> <p>Request clarification of the tender documents, if necessary, by notifying the employer at least five (5) working days before the closing time stated in the <b><i>Tender Data</i></b>.</p>	<p>C.2.12.1 Unless otherwise stated in the <b><i>Tender Data</i></b>, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted as well as a schedule that compares the requirements of the tender documents with the alternative requirements that are proposed.</p>
<p><b>C.2.9 Insurance</b></p> <p>Be aware that the extent of insurance to be provided by the employer (if any) might not be for the full cover required in terms of the conditions of contract identified in the <b><i>Contract Data</i></b>. The tenderer is advised to seek qualified advice regarding insurance.</p>	<p>C.2.12.2 Accept that an alternative tender offer must be based only on the criteria stated in the <b><i>Tender Data</i></b> or criteria otherwise acceptable to the employer.</p> <p>C.2.12.3 An alternative tender offer must only be considered if the main tender offer is the winning tender.</p>
<p><b>C.2.10 Pricing the tender offer</b></p> <p>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 fourteen (14) days before the closing time stated in the <b><i>Tender Data</i></b>.</p> <p>C.2.10.2 Show VAT payable by the employer separately as an addition to the tendered total of the prices.</p> <p>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 <b><i>Contract Data</i></b>.</p> <p>C.2.10.4 State the rates and prices in Rand unless instructed otherwise in the <b><i>Tender Data</i></b>. The conditions of contract identified in the <b><i>Contract Data</i></b> may provide for part payment in other currencies.</p>	<p><b>C.2.13 Submitting a tender offer</b></p> <p>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 <b><i>Contract Data</i></b> and described in the scope of works, unless stated otherwise in the <b><i>Tender Data</i></b>.</p> <p>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 legibly in non-erasable ink.</p> <p>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 <b><i>Tender Data</i></b>, 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.</p>
<p><b>C.2.11 Alterations to documents</b></p> <p>Do not make any alterations or additions to the tender documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations.</p>	<p>C.2.13.4 Sign the original and all copies of the tender offer where required in terms of the <b><i>Tender Data</i></b>. 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.</p>
	<p>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</p>

<p>employer's address and identification details stated in the <b><i>Tender Data</i></b>, as well as the tenderer's name and contact address.</p>	
<p>C.2.13.6 Where a two-envelope system is required in terms of the <b><i>Tender Data</i></b>, place and seal the returnable documents listed in the <b><i>Tender Data</i></b> 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 <b><i>Tender Data</i></b>, as well as the tenderer's name and contact address.</p>	
<p>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 <b><i>Tender Data</i></b>.</p>	<p>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 <b><i>Tender Data</i></b> after the closing time stated in the <b><i>Tender Data</i></b>.</p>
<p>C.2.13.8 Accept that the employer will not assume any responsibility for the misplacement or premature opening of the tender offer if the outer package is not sealed and marked as stated.</p>	<p>C.2.16.2 If requested by the employer, consider extending the validity period stated in the <b><i>Tender Data</i></b> for an agreed additional period with or without any conditions attached to such extension.</p>
<p>C.2.13.9 Accept that tender offers submitted by facsimile or e-mail will be rejected by the employer, unless stated otherwise in the <b><i>Tender Data</i></b>.</p>	<p>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).</p>
<p><b>C.2.14 Information and data to be completed in all respects</b></p> <p>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.</p>	<p>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".</p>
<p><b>C.2.15 Closing time</b></p> <p>C.2.15.1 Ensure that the employer receives the tender offer at the address specified in the <b><i>Tender Data</i></b> not later than the closing time stated in the <b><i>Tender Data</i></b>. Accept that proof of posting shall not be accepted as proof of delivery.</p>	<p><b>C.2.17 Clarification of tender offer after submission</b></p> <p>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 competitive position of tenderers or substance of the tender offer is sought, offered, or permitted.</p> <p><i>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.</i></p>
<p>C.2.15.2 Accept that, if the employer extends the closing time stated in the <b><i>Tender Data</i></b> for any reason, the requirements of these conditions of tender apply equally to the extended deadline.</p>	<p><b>C.2.18 Provide other material</b></p> <p>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), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment.</p>

	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.		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:
C.2.18.2	Dispose of samples of materials provided for evaluation by the employer, where required.		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>C.2.19 Inspections, tests and analysis</b>			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
	Provide access during working hours to premises for inspections, tests and analysis as provided for in the <b><i>Tender Data</i></b> .		c) in the opinion of the Employer, acceptance of the material change would compromise the outcome of the prequalification process.
<b>C.2.20 Submit securities, bonds and policies</b>			
	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 <b><i>Contract Data</i></b> .	<b>C.3.2 Issue Addenda</b>	
<b>C.2.21 Check final draft</b>			If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until three (3) working days before the tender closing time stated in the <b><i>Tender Data</i></b> . If, as a result a tenderer applies for an extension to the closing time stated in the <b><i>Tender Data</i></b> , the Employer may grant such extension and, shall then notify all tenderers who collected tender documents.
<b>C.2.22 Return of other tender documents</b>			
	If so instructed by the employer, return all retained tender documents within twenty-eight (28) days after the expiry of the validity period stated in the <b><i>Tender Data</i></b> .	<b>C.3.3 Return late tender offers</b>	
<b>C.2.23 Certificates</b>			Return tender offers received after the closing time stated in the <b><i>Tender Data</i></b> , unopened, (unless it is necessary to open a tender submission to obtain a forwarding address), to the tenderer concerned.
	Include in the tender submission or provide the employer with any certificates as stated in the <b><i>Tender Data</i></b> .	<b>C.3.4 Opening of tender submissions</b>	
<b>C.3 The employer's undertakings</b>			
<b>C.3.1 Respond to requests from the tenderer</b>			
C.3.1.1	Unless otherwise stated in the <b><i>Tender Data</i></b> , respond to a request for clarification received up to five (5) working days before the tender closing time stated in the <b><i>Tender Data</i></b> and notify all tenderers who collected tender documents.	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 <b><i>Tender Data</i></b> . Tender submissions for which acceptable reasons for withdrawal have been submitted will not be opened.
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	C.3.4.2	Announce at the meeting held immediately after the opening of tender submissions, at a venue indicated in the <b><i>Tender Data</i></b> , the name of each tenderer whose tender offer is opened and, where applicable, the total of his prices, number of points claimed for its BBBEE status level and time for completion 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) is responsive to the other requirements of the tender documents.
<b>C.3.5</b>	<b>Two-envelope system</b>	<b>C.3.8.2</b>
C.3.5.1	Where stated in the <b>Tender Data</b> 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 <b>Tender Data</b> and announce the name of each tenderer whose technical proposal is opened.	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: <ul style="list-style-type: none"> <li>a) detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,</li> <li>b) significantly change the Employer's or the tenderer's risks and responsibilities under the contract, or</li> <li>c) affect the competitive position of other tenderers presenting responsive tenders, if it were to be rectified.</li> </ul> <p>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.</p>
C.3.5.2	Evaluate functionality of the technical proposals offered by tenderers, then advise tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of tenderers, who score in the functionality evaluation more than the minimum number of points for functionality stated in the <b>Tender Data</b> , 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.	
<b>C.3.6</b>	<b>Non-disclosure</b>	<b>C.3.9</b>
	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.	<b>Arithmetical errors, omissions and discrepancies</b>
<b>C.3.7</b>	<b>Grounds for rejection and disqualification</b>	<b>C.3.9.1</b>
	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.	Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern.
<b>C.3.8</b>	<b>Test for responsiveness</b>	<b>C.3.9.2</b>
C.3.8.1	Determine, after opening and before detailed evaluation, whether each tender offer properly received: <ul style="list-style-type: none"> <li>a) complies with the requirements of these Conditions of Tender,</li> <li>b) has been properly and fully completed and signed, and</li> </ul>	Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with C.3.11 for: <ul style="list-style-type: none"> <li>a) the gross misplacement of the decimal point in any unit rate;</li> <li>b) omissions made in completing the pricing schedule or bills of quantities; or</li> <li>c) arithmetic errors in: <ul style="list-style-type: none"> <li>(i) line-item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or</li> <li>(ii) the summation of the prices.</li> </ul> </li> </ul> <p>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.</p>
		<b>C.3.9.3</b>
		Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:
		<b>C.3.9.4</b>

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

### 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.

The CIDB Standard Conditions of Tender are based on a procurement system that satisfies the following system requirements:	
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 .

**C.3.11.1 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**

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.

**T1.2.2 TENDER DATA**

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

**C.1: GENERAL****C.1.1 The employer:**

The Employer for this Contract is the **eThekwini Municipality** as represented by:  
Deputy Director: **Water and Sanitation Engineering**

**C.1.2 Tender documents:**

The Tender Documents issued by the Employer comprise:

- 1) This procurement document.
- 2) The **Conditions of Contract** identified in Section C1.2.1.1. Tenderers/ Contractors are required to obtain their own copies.
- 3) The **Specifications** identified in Section C3.3.1. Tenderers/ Contractors are required to obtain their own copies.
- 4) **Drawings**, if applicable, issued separately from this document, or bound in Section C3.4 (as an Annexure).
- 5) In addition, Tenderers are advised, in their own interest, to obtain their own copies of the following acts, regulations, and standards referred to in this document as they are essential for the Tenderer to get acquainted with the basics of construction management, the implementation of preferential construction procurement policies, and the participation of targeted enterprise and labour.
  - The Employer's Supply Chain Management Policy (as at advertising date).
  - The Occupational Health and Safety Act No 85 and Amendment Act No 181 of 1993, and the Construction Regulations (2014).
  - The Construction Industry Development Board Act No 38 of 2000 and the Regulations issued in terms of the Act (July 2013).
  - SANS 1921:2004 – Construction and Management Requirements for Works Contract, Parts 1-3.
  - CIDB Standard for Developing Skills Through Infrastructure Contracts, published in Gazette Notice No. 48491 of 28 April 2023.
  - CIDB Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts, published in Gazette Notice No. 36190 of 25 February 2013.
  - Any other eThekwini Policy documents referenced in the Tender Documents.

Electronically downloaded documentation is obtainable from the National Treasury's **eTenders Website** or the **eThekwini Municipality Website** at URL:

- <https://www.etenders.gov.za/>
- <https://www.durban.gov.za/pages/business/procurement>

**C.1.4 Communication and employer's agent:**

The Employer's Agent is:

Name: Terence Thumbaya  
Tel: 031-265-6011  
eMail:  
Terence.Thumbaya@naiduconsulting.com

The Employer's Agent's Representative is:

Devesh Ramghulam  
Tel: 031-265-6007  
eMail:  
Devesh.Ramghulam@naiduconsulting.com

Contractual Queries can be addressed to:  
 Sivashan Pillay  
 Tel: 031-322-2636  
 eMail: Sivashan.Pillay@durban.gov.za

The Tenderer's contact details, as indicated on **Returnable Document T2.2.1: Compulsory Enterprise Questionnaire**, shall be deemed as the only valid contact details for the Tenderer for use in communications between the Employer's Agent and the Tenderer during tender evaluation.

## C.2: TENDERER'S OBLIGATIONS

### C.2.1 Eligibility:

Entities may only submit one (1) tender offer, either as a single tendering entity or as a partner of a joint venture. Should a tendering entity submit more than one (1) tender, **all** submissions by that tendering entity, including submissions where the entity is a partner of a joint venture, will be deemed not to be eligible.

#### C.2.1.1 Eligibility: General

A Tenderer will not be eligible to submit a tender if:

- (a) In the event of a Compulsory Clarification Meeting:
  - i) the Tenderer fails to attend the Compulsory Clarification Meeting, or
  - ii) the Tenderer fails to have **Returnable Document T2.2.2: Certificate of Attendance at Clarification Meeting / Site Inspection** signed by the Employer's Agent or their representative.
- (b) At the time of tender closing, the Tenderer is not registered on the **National Treasury Central Supplier Database (CSD)** and the **eThekweni Municipality Supplier Portal**. In the case of a Joint Venture, this requirement will apply individually to each party in the Joint Venture. Tenderers are to reference **Returnable Document T2.2.1: Compulsory Enterprise Questionnaire** (section 1.5) and **Returnable Document T2.2.12: "CSD Registration Report"**.
- (c) In the case of Joint Venture (JV) submissions, two or more JV entities have common directors/ shareholders or common entities tendering for the same works.
- (d) The following documentation is to be completed in full, signed, and returned with the tender submission. Failure to comply will result in the tender offer being deemed non-responsive:
  - T2.2.1: Compulsory Enterprise Questionnaire.
  - T2.2.5: MBD 4: Declaration of Interest.
  - T2.2.6: MBD 5: Declaration for Procurement Above R10 Million (if applicable).
  - T2.2.8: MBD 8: Declaration of Bidder's Past SCM Practices.
  - T2.2.9: MBD 9: Certificate of Independent Bid Determination.
  - T2.2.10: Declaration of Municipal Fees
- (e) The certificates listed in the **Tender Data: C.2.23: Certificates** are to be included with the tender submission. Failure to comply will result in the tender offer being deemed non-responsive. These include:
  - T2.2.1: Compulsory Enterprise Questionnaire
    - SARS Tax Compliance Status – PIN Issued.
  - T2.2.6: MBD 6.1: Preference Points Claim
    - B-BBEE Status Level of Contribution Certificate.
  - T2.2.12: Central Supplier Database (CSD) Report.
  - T2.2.13: CIDB Registration and Status.

**C.2.1.2 Eligibility: CIDB**

Tenderers are to reference the provisions of **Tender Data: C.2.23: Certificates and Returnable Document: T2.2.13: Verification of CIDB Registration and Status** with respect to CIDB registration.

Only those Tenderers who are registered (as “Active”) with the CIDB (at time of tender closing), in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations, for a **CE** class of construction work, are eligible to have their tenders evaluated.

Joint ventures are eligible to submit tenders provided that:

- (a) Every member of the joint venture is registered (as “Active”) with the CIDB (at time of tender closing),
- (b) The lead partner has a contractor grading designation in the **CE** class of construction work and has a grading designation of not lower than one level below the required grading designation, and
- (c) The combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations (2013) is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a **CE** class of construction work or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations.

**C.2.2.2 The cost of the tender documents:**

Replace this paragraph with the following:

“Documents are to be downloaded, free of charge, from the **National Treasury’s eTenders website** or the **eThekwini Municipality’s Website**.”

**C.2.6 Acknowledge addenda:**

Add the following paragraphs:

“Addenda will be published on the **eThekwini Municipality website** as stated in **Tender Data: C.1.2**. Tenderers are to ensure that this website is consulted for any published addenda pertaining to this tender up to three days before the tender closing time as stated in the **Tender Data**.”

“Acknowledgement of receipt of the addenda will be by the return of the relevant completed, dated, and signed portion of the addenda, to the physical or email address as specified on the addenda.

Failure of the Tenderer to comply with the requirements of the addenda WILL result in the tender submission being made non-responsive.”

**C.2.7 Clarification meeting:**

**Trenance 3 Reservoir Site, 207 Madrona Dr, Trenance Park, Amaotana 4068. On the 13 October 2025 at 10h00.**  
**Co-ordinates: 29°39'7.86"S, 30° 59'47.17"E**

In the event of a Compulsory Clarification Meeting, Tenderers must sign the attendance register in the name of the tendering entity. The Tenderer’s representative(s) at the clarification meeting must be able to clearly convey the discussions at the meeting to the person(s) responsible for compiling the entity’s tender offer.

**C.2.10.2 Pricing the tender offer:**

The following is to be noted in terms of Tenderers being **VAT Registered**, or being a **Non-VAT Vendor** (ie. not VAT registered).

If the Tenderer is **VAT registered**, the Tenderer's Rates in the Bill of Quantities (BoQ) are to exclude VAT. VAT is to be shown separately on the BoQ summary page, and on the Form of Offer (Part C1.1.1).

If the Tenderer is a **Non-VAT Vendor**, the Tenderer's Rates in the Bill of Quantities are to include VAT. VAT is not to be shown separately on the BoQ summary page, or on the Form of Offer (Part C1.1.1). VAT will not be added to, or deducted from, rates or prices submitted from **Non-VAT Vendors**. The tendered priced will be deemed to include all VAT, taxes, and any applicable excise duties.

Tenderers are to refer to Part C2.1: PRICING ASSUMPTIONS / INSTRUCTIONS prior to pricing the tender offer.

**C.2.12 Alternative tender offers:**

No alternative tender offers will be considered.

**C.2.13 Submitting a tender offer:**

The signed Tender Offer ("hard copy") is to be sealed in an envelope, addressed to the City Manager, marked with the **identification details** and be delivered to the **delivery address**, both as stated below.

The **Tender Offer** (hard copy) is to be delivered to the following **delivery address**:  
the Tender Box in the foyer of the Municipal Building, 166 KE Masinga Road, Durban

**Identification details** to be shown on the hard copy package are:

- Contract No. : **32269-5W**
- Contract Title : **Trenance 3 Reservoir: The Construction of a 6 Mℓ Reinforced Concrete Reservoir, Pump Station, Inlet & Outlet Pipework, 400 Kℓ Elevated Tank and Ancillary Works: Ward 59**

Tender Offers are also to be **SUBMITTED ELECTRONICALLY** (uploaded) on the eThekweni Municipality **JDE System** (Supplier Self Service (SSS Module)). For information pertaining to the JDE System, Tenderers are referred to **Section T1.1.2**.

Notwithstanding the **electronic submission**, a tender offer will only be deemed valid if the "hard copy" submission has been made. The "hard copy" submission will be the governing submission.

The Tender documentation, issued by the eThekweni Municipality (refer to **Tender Data: C.1.2**), is to be printed in its entirety. Printing should be done on white A4 paper, with printing on only one side of the paper. (It is suggested that the Tender documentation is not stapled, or punched for filing, prior to scanning, as this could affect the scanning process.)

After completion and signature (using **BLACK INK**), the entire Tender document is to be scanned to a single PDF (**P**ortable **D**ocument **F**ormat) document, at a resolution of 300 DPI (dots per inch). The PDF document is to be uploaded via the (Tender specific) upload option on the JDE System (SSS Module). Tenderers are responsible for resolving all access rights and submission queries on the JDE System before the tender closing date/ time (**Tender Data: C.2.15**).

Tender Offer delivery, and the electronic submission on the JDE System, are both to be completed on or before the closing date/ time stated in the **Tender Data: C.2.15**.

The submission of Tender Offers via any means other than that stated above will not be accepted, and those that are will be deemed invalid.

#### C.2.15 Closing date and time:

The closing time is:

- Date : **Friday, 07 November 2025**
- Time : **11h00**

The **delivery of the hard copy AND** the completion of the requirements on the **JDE System (SSS Module)** are to be completed prior to the Tender **closing date and time** as stated above. Any Tender Offer submitted thereafter will not be considered.

#### C.2.16 Tender offer validity:

The Tender Offer validity period is **120 Days** from the closing date for submission of tenders. In terms of SCM policy ( cl.21.2.) tenders must remain valid for acceptance for a period of twelve (12) months after the expiry date of the original validity period, unless the municipality is notified in writing of anything to the contrary by the tenderer.

#### C.2.23 Certificates:

Refer to **T2.1: “List of Returnable Documents”** for a listing of certificates that must be provided with the tender. All certificates must be valid at the time of tender closing.

Tenderers are to include a printout of the required documents/ certificates at the back of their tender submission.

#### **SARS Tax Compliance Status – PIN Issued**

Reference is to be made to **Returnable Document T2.2.1: Compulsory Enterprise Questionnaire**.

#### **B-BBEE Status Level of Contribution Certificate**

Tenderers are referred to **Returnable Document T2.2.6: MBD 6.1: Preference Points Claim** for the B-BBEE Certificate requirements.

#### **Central Supplier Database (CSD)**

Reference is to be made to **Returnable Document T2.2.12: CSD Registration Report**.

The entities **CSD Registration Report**, obtained from the National Treasury Central Supplier Database (CSD), is to be included in the tender submission ( <https://secure.csd.gov.za> ).

The date of the report, as indicated at the top right of each page, should be on or after the date of advertising of this tender.

Separate **CSD Registration Reports** are required for each party to a Joint Venture.

#### **CIDB Registration** (if applicable)

Reference is to be made to **Returnable Document T2.2.13: Verification of CIDB Registration and Status**.

Tenderers are to include with their submission a printout of their **CIDB Registration**, obtained from the CIDB website ( <https://portal.cidb.org.za/RegisterOfContractors/> ).

The date of obtaining the CIDB printout(s) is to be indicated on the printout, and the Tenderer's registration with the CIDB must be reflected as "Active" as at the date of tender closing.

Separate **CIDB Registration printouts** are required for each party to a Joint Venture. The **Joint Venture Grading Designation Calculator** printout should be included when making a submission as a Joint Venture:  
( <https://registers.cidb.org.za/PublicContractors/JVGradingDesignationCalc> )

### C.3: THE EMPLOYER'S UNDERTAKINGS

#### C.3.1.1 Respond to requests from the tenderer:

Replace the words "five working days" with "three working days".

#### C.3.2 Issue addenda:

Add the following paragraph:

"Addenda will be published on the **eThekwini Municipality Website** (refer to **Tender Data: C.1.2**).

#### C.3.4 Opening of Tender Submissions:

Tenders will be opened immediately after the closing time for tenders. The public reading of tenders will take place in the P&SCM Boardroom, 6<sup>th</sup> Floor, (Municipal Building), 166 KE Masinga Road, Durban.

The tender opening schedule will also be made available on the eThekwini Municipal website at URL: <https://www.durban.gov.za/pages/business/publication-of-received-bids>

#### C.3.9 Arithmetical errors, omissions and discrepancies:

Add the following Clause:

"C.3.9.5 Reject a tender offer if the Tenderer does not accept the correction of the arithmetical error in the manner described in C.3.9.4."

#### C.3.11 Evaluation of Tender Offers:

##### Eligibility

Tenders will be checked for compliance with the ELIGIBILITY requirements, as specified in the **Tender Data: C.2.1**. Tenders not in compliance will be deemed non-responsive.

##### Functionality

FUNCTIONALITY will be evaluated to determine the responsiveness of tenders received. The minimum score for FUNCTIONALITY is 60 points. Those tenders not achieving the minimum score will be deemed non-responsive.

The functionality Criteria, Sub-Criteria, Points per Criteria/ Sub-Criteria, Returnable Documentation and Schedules, Method of Evaluation, and Prompts for Judgement are as specified in **Part T1.2.3: Additional Conditions of Tender**.

### **Preference Point System**

The procedure for the evaluation of responsive tenders is **PRICE AND PREFERENCE**, in accordance with the Employer's **SCM Policy: Section 52: Preferential Procurement**.

### **Price Points**

The **80/20** preference points system, for requirements with a Rand value of up to R50,000,000 (all applicable taxes included), will be applied. The Formula used to calculate the **Price Points (max.**

**80)** will be according to that specified below.

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

#### **80/20 Procurement System**

$$P_s = 80 \left( 1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$$

Where:

$P_s$	=	Points scored for comparative price of bid under consideration
$P_t$	=	Comparative price of bid under consideration
$P_{\min}$	=	Comparative price of lowest acceptable bid

### **Preference Points**

Reference is to be made to **Returnable Form: MBD 6.1: Preference Points Claim**.

The Basket of Preference Goals (SCM Policy Section 52.7)

The provisions of the SCM Policy: **Section 52.7: The Basket of Preference Goals** shall apply. Reference is to be made to **Returnable Form: MBD 6.1: Preference Points Claim**.

The Preference Points 20 will be derived from points claimed for **Specific Goals** as indicated in the table(s) below, according to the specified **Goal/ Category Weightings**.

- **Ownership Goal**  
Goal Weighting: **60%**

Ownership Categories	Criteria	80/20	
<b>Race: Black (w1)</b>	Equals 0%	0	
	Between 0% and 51%	1.6	
	Greater or equal to 51% and less than 100%	3.2	
	Equals 100%	4	

<b>Gender: Female (w2)</b>	Equals 0%	0	
	Between 0% and 51%	1.6	
	Greater or equal to 51% and less than 100%	3.2	
	Equals 100%	4	

<b>Disabilities (w3)</b>	Equals 0%	0	
	Between 0% and 51%	1.6	
	Greater or equal to 51% and less than 100%	3.2	
	Equals 100%	4	

Maximum Ownership Goal Points:

12

The **Weightings** of the **Ownership Categories** will be:

- w1 = 20%, w2=20%, w3=20% (where: w1 + w2 + w3 = 60%)

**Proof of claim as declared on MBD 6.1** (1 or more of the following will be used in verifying the Tenderer's status)

- Companies and Intellectual Property Commission registration document (CIPC)
- CSD report.
- B-BBEE Certificate of the tendering entity.
- Consolidated BBBEE Certificate if the tendering entity is a Consortium, Joint Venture, or Trust (Issued by verification agency accredited by the South African Accreditation System).
- Agreement for a Consortium, Joint Venture, or Trust.

### • RDP Goal: The promotion of South African owned enterprises

Goal Weighting: 40%

The tendering entity's **Address** (as stated on the National Treasury Central Supplier Database (CSD) or on the eThekweni Municipality Vendor Portal) is to be used in the determination of the Tenderer's claim for **Preference Points** for this Specific Goal.

Location	80/20
Not in South Africa	0
South Africa	2
Kwa Zulu Natal	4
eThekweni Municipality	8
<b>Maximum Goal Points:</b>	8

**Proof of claim as declared on MBD 6.1** (1 or more of the following will be used in verifying the Tenderer's status)

- CSD report

### C.3.13 Acceptance of tender offer:

In addition to the requirements of **Tender Data: C.3.13** of the **Standard Conditions of Tender**, tender offers will only be accepted if:

- (a) The Tenderer's municipal rates and taxes are not in arrears, or they have made arrangements

to meet outstanding municipal fee obligations.

- (b) The Tenderer's tax compliance status has been verified, or they have made arrangements to meet outstanding tax obligations.
- (c) If applicable, the Tenderer is **registered**, and "**Active**", with the **Construction Industry Development Board** in an appropriate contractor grading designation.
- (d) The Tenderer or any of its directors/ shareholders are **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.
- (e) 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.
- (f) The Employer is reasonably satisfied that the Tenderer has in terms of the Construction Regulations (2014), issued in terms of the Occupational Health and Safety Act (1993), the **necessary competencies and resources to carry out the work safely**.

The Municipality does not bind itself to accept the lowest or any tender. It reserves the right to accept the whole or any part of a tender to place orders. Bidders shall not bind the Municipality to any minimum quantity per order. The successful Tenderer(s) shall be bound to provide any quantities stipulated in the specification.

The municipality has a firm intention to proceed with the work, subject to funding being identified. Notwithstanding the **Standard Conditions of Tender: C.1.1.3** of, the municipality reserves the right to award or not award the tender based on the municipalities available budget.

#### **C.3.15 Complete adjudicator's contract:**

Refer to the Conditions of Contract and the Contract Data.

#### **C.3.17 Copies of contract:**

The number of paper copies of the signed contract to be provided by the Employer is ONE (1). Tenderers are referred to the requirements as stated in the **Tender Data: C.2.13**.

**T1.2.3 ADDITIONAL CONDITIONS OF TENDER****T1.2.3.1 Complaints and Objections (Appeals)**

Reference is to be made to Clause 49 of the eThekweni Supply Chain Management Policy. In terms of Section 49 of the EtheKwini SCM Policy any person aggrieved by decisions taken in the implementation of the SCM System may lodge, within 14 days of notification thereof, a written objection against the decision. The objection with regard to the decision is to be directed to:

The City Manager  
 Attention Ms S. Pillay      eMail: Simone.Pillay@durban.gov.za  
 P O Box 1394  
 DURBAN  
 4000

Any objection will only be processed upon receipt of a non-refundable administration fee of **R1,814.00** (including VAT), as stipulated in the Municipality's current SCM Policy. An objection will only be considered upon receipt of proof of payment of this fee which must be paid into the following bank account as a real-time payment:

EThekweni Metropolitan Municipality  
 Nedbank  
 Account Number: 110-782-1118  
 Reference Number: 32269-5W

**T1.2.3.2 Prohibition on awards to persons in the service of the state**

Clause 44 of the Supply Chain Management Regulations states that the Municipality or Municipal Entity may not make any award to a person:

- (a) Who is in the service of the State;
- (b) If that person is not a natural person, of which a director, manager, principal shareholder or stakeholder is a person in the service of the state; or
- (c) Who is an advisor or consultant contracted with the municipality or a municipal entity.

Should a contract be awarded, and it is subsequently established that Clause 44 has been breached, the Employer shall have the right to terminate the contract with immediate effect.

**T1.2.3.3 Code of Conduct and Local Labour**

The Tenderers shall make themselves familiar with the requirements of the following policies:

- Code of Conduct;
- The Use of CLOs and Local Labour.

**T1.2.3.4 Functionality Specification**

Functionality Evaluation criteria and maximum score in respect of each of the criteria are as follows:

The Functionality criteria (and sub criteria if applicable) and maximum score in respect of each of the criteria are as follows:

Functionality Criteria / Sub Criteria		Maximum Points Score
Tenderer's Experience		40
Project Organogram and Experience of Key Staff	Contracts Manager	15
	Construction Manager	15
	Concrete Lead Foreman	10
	Civil Lead Foreman	10
Preliminary Programme, Construction Methodology & Quality Control		10
<b>Maximum possible score for Functionality (M<sub>s</sub>)</b>		<b>100</b>

Functionality Criteria	Returnable Schedules
Tenderer's Experience	<ul style="list-style-type: none"> <li>Experience of Tenderer</li> </ul>
Project Organogram and Experience of Key Staff	<ul style="list-style-type: none"> <li>Proposed Organisation and Staffing</li> <li>Key Personnel</li> <li>CV's with Experience of Key Personnel</li> </ul>
Preliminary Programme	<ul style="list-style-type: none"> <li>Preliminary Programme</li> </ul>
Construction Methodology & Quality Control	<ul style="list-style-type: none"> <li>Construction Approach,</li> <li>Methodology, and Quality Control</li> <li>Schedule of Proposed Subcontractors</li> <li>Plant and Equipment</li> </ul>

The minimum number of evaluation points for Functionality is **60**. Only those Tenderers who achieve the minimum number of Functionality evaluation points (or greater) will be eligible to have their tenders further evaluated.

Functionality shall be scored by not less than three evaluators and the scores of each of the evaluators will be averaged, weighted and then totalled to obtain the final score for Functionality. Each evaluation criteria will be assessed in terms of six indicators and scores allocated according to the following table:

Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
0	20	40	60	80	100

Evaluation criteria will be adjudicated according to submissions made in accordance with the following schedules, which are found in T2.2: Returnable Schedules:

Unless otherwise stated, evaluation criteria will be adjudicated with respect to the contract specific Scope of Work, as specified in C.3. In this regard the following definitions apply to the evaluation criteria prompts for judgement:

- **“successfully completed”** implies a project has been completed on time and to specification;
- **“similar nature”** refers to projects involving the construction of reinforced concrete water-retaining structures with a capacity of at least 5 megalitres (ML), completed within the past 10 years.;
- **“experience”** implies experience on projects of a similar nature;
- **“accredited degree / diploma”** implies a minimum 3 year qualification within the built environment, from a registered University or Institute of Technology.

Criterion: Tenderer’s Experience	
Note: “successfully completed” implies that a project has been <b>completed on time and to specification</b> . The tenderer must submit certificates of completion and signed letters from respective Client/s confirming completion of the said project. Where the tenderer is unable to obtain a signed letter from a previous client then the tenderer can submit a signed affidavit. Failure to submit this information will result in the project not being considered as part of the evaluation".	
Level 0	No information provided; OR submission of no substance / irrelevant information provided
Level 1	To have successfully completed <u>2 projects</u> of a similar nature within the past 10 years.
Level 2	To have successfully completed <u>3 to 4 projects</u> of a similar nature within the past 10 years.
Level 3	To have successfully completed <u>5 to 6 projects</u> of a similar nature within the past 10 years.
Level 4	To have successfully completed <u>7 to 8 projects</u> of a similar nature within the past 10 years.
Level 5	To have successfully completed <u>9+ projects</u> of a similar nature within the past 10 years.

**Note:** Projects of a similar nature that will be considered shall be proven experience as the main or lead Contractor in the Construction of:

- Reinforced concrete water retaining structures with a capacity of at least 5 megalitres (ML), completed within the past 10 years.

<b>Criterion: Project Organogram and Experience of Key Staff</b> Note 1: "experience" implies experience on projects of a similar nature with respect to the Scope Note 2: "accredited degree / diploma" implies a minimum 3 yr qualification within the built environment, from a registered University or Institute of Technology.				
	<b>CONTRACTS MANAGER</b>	<b>CONSTRUCTION MANAGER</b>	<b>CONCRETE LEAD FOREMAN</b>	<b>CIVIL LEAD FOREMAN</b>
Level 0	No information provided OR submission of no substance / irrelevant information provided	No information provided OR submission of no substance / irrelevant information provided	No information provided OR submission of no substance / irrelevant information OR Less than 3 year's experience.	No information provided OR submission of no substance / irrelevant information OR Less than 3 year's experience.
Level 1	Relevant accredited diploma / degree and minimum 2 year's experience.	Relevant accredited diploma / degree and minimum 2 year's experience.	minimum 3 year's experience.	minimum 3 year's experience.
Level 2	Relevant accredited diploma / degree and minimum 3 year's experience.	Relevant accredited diploma / degree and minimum 3 year's experience.	minimum 4 year's experience.	minimum 4 year's experience.
Level 3	Relevant accredited diploma / degree and minimum 5 year's experience.	Relevant accredited diploma / degree and minimum 5 year's experience.	minimum 5 year's experience.	minimum 5 year's experience.
Level 4	Relevant accredited diploma / degree and minimum 8 year's experience.	Relevant accredited diploma / degree and minimum 8 year's experience.	minimum 9 year's experience.	minimum 9 year's experience.
Level 5	Relevant accredited diploma / degree and minimum 10 year's experience.	Relevant accredited diploma / degree and minimum 10 year's experience.	minimum 11 year's experience.	minimum 11 year's experience.
<b>Notes:</b>	<b>1. The tenderer is to submit the CVs of the key personnel that are proposed for this project. The following documents must accompany the CVs of each key personnel:</b> <ul style="list-style-type: none"> <li>A signed declaration from the proposed individual stating that he/she is employed by the tenderer, or he/she will be available on a full-time employment, from the commencement of the project until the completion of the project, subject to their mandatory notice period.</li> <li>All supporting documents (Declaration, identity document, qualifications, and professional registration certificates).</li> </ul> <b>2. If a tenderer fails to submit the CV or the supporting documents for any of the key personnel then that key personnel will obtain a score of zero (0).</b>			

Criterion: Preliminary Programme, Construction Methodology & Quality Control	
<b>Level 0</b>	No information provided; OR submission of no substance / irrelevant information provided
<b>Level 1</b>	<p><u>Programme</u> Programme <u>does not cover</u> all the applicable individual activities which are in an acceptable sequence, with appropriate durations, and is in accordance with generally accepted construction practice, and is in line with Clause 1.1.1.14 of the Conditions of Contract (time for achieving Practical Completion).</p> <p><u>Methodology</u> The technical approach and/or methodology is less than acceptable and unlikely to satisfy project objectives or requirements. Plant and equipment is unlikely to provide adequate protection of the works. Quality control statement is generic.</p>
<b>Level 2</b>	<p><u>Programme</u> Programme <u>covering</u> all the applicable individual activities which are in an acceptable sequence, with appropriate durations, and is in accordance with generally accepted construction practice, and is in line with Clause 1.1.1.14 of the Conditions of Contract (time for achieving Practical Completion).</p> <p><u>Methodology</u> Brief overview of a site-specific methodology which encompasses all programmed activities in appropriate order and includes staff, plant and equipment resources, including subcontractors if applicable, a brief description of preparatory work, construction processes including finishing works for each activity. Quality control statements are site specific with statements covering required sampling and testing requirements for the programmed activities.</p>
<b>Level 3</b>	<p><u>Programme</u> Programme <u>covering</u> all the applicable individual activities which are in an acceptable sequence, with appropriate durations, and is in accordance with generally accepted construction practice, and is in line with Clause 1.1.1.14 of the Conditions of Contract (time for achieving Practical Completion).</p> <p><b>Plus:</b></p> <ul style="list-style-type: none"> <li>Shows critical path with logical linking of tasks/activities</li> </ul> <p><u>Methodology</u> The methodology is specifically tailored to address specific project requirements. The methods and approach to managing risk etc. are specifically tailored to the critical characteristics of the project. The plant and equipment are specifically tailored to the project requirements and are sufficiently adaptable to accommodate changes that may be required during execution. Quality control statements are site specific covering required sampling and testing for programmed activities including site specific quality control checklist for programmed activities.</p>
<b>Level 4</b>	<p><u>Programme</u> Programme <u>covering</u> all the applicable individual activities which are in an acceptable sequence, with appropriate durations, and is in accordance with generally accepted construction practice, and is in line with Clause 1.1.1.14 of the Conditions of Contract (time for achieving Practical Completion).</p> <p><b>Plus:</b></p> <ul style="list-style-type: none"> <li>Shows critical path with logical linking of tasks/activities, and Detailed activity and resources breakdown.</li> <li>Cashflow included</li> </ul> <p><u>Methodology</u> The important issues are approached in an innovative and efficient way, indicating that the tenderer has excellent knowledge of working in the projects environment and producing the required final product. Plant and equipment proposals and ownership/provision arrangements are most likely to ensure a satisfactory project outcome. Quality control statements are site specific covering required sampling and testing for all programmed activities including site specific quality control checklist for all programmed activities.</p>
<b>Level 5</b>	<p><u>Programme</u> Programme <u>covering</u> all the applicable individual activities which are in an acceptable sequence, with appropriate durations, and is in accordance with generally accepted construction practice, and is in line with Clause 1.1.1.14 of the Conditions of Contract (time for achieving Practical Completion).</p> <p><b>Plus:</b></p> <ul style="list-style-type: none"> <li>Shows critical path with logical linking of tasks/activities, and Detailed activity and resources breakdown.</li> <li>Cashflow included</li> <li>Detailed Plant and equipment resource breakdown</li> </ul> <p><u>Methodology</u> The important issues are approached in an innovative and efficient way, indicating that the tenderer has excellent knowledge of working in the projects environment and producing the required final product. Plant and equipment proposals and ownership/provision arrangements are most likely to ensure a satisfactory project outcome. Quality control statements are site specific covering required sampling and testing for all programmed activities including site specific quality control checklist for all programmed activities.</p>

## **PART T2: RETURNABLE DOCUMENTS**

### **T2.1 LIST OF RETURNABLE DOCUMENTS**

#### **T2.1.1 General**

The Tender Submission Documentation must be submitted in its entirety. All forms must be properly completed and signed as required.

The Tenderer is required to complete and sign each and every Schedule and Form listed below to the best of their ability as the evaluation of tenders and the eventual contract will be based on the information provided by the Tenderer.

Failure of a Tenderer to complete the Schedules and Forms to the satisfaction of the Employer will inevitably prejudice the tender and may lead to rejection on the grounds that the tender is non-responsive.

#### **T2.1.2 Returnable Schedules, Forms and Certificates**

##### **Entity Specific**

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##### **Technical or Functionality Evaluation**

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T2.2.19	Preliminary Programme .....	56
T2.2.20	Construction Approach, Methodology, and Quality Control .....	57
T2.2.21	Schedule of Proposed Subcontractors .....	58
T2.2.22	Plant and Equipment .....	59
T2.2.23	Contractor's Health and Safety Plan .....	60

**Contract Part:** The Tenderer is required to complete following forms:

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**T2.2.1 COMPULSORY ENTERPRISE QUESTIONNAIRE**

Ref	Description	Tenderer to Complete	
1.1	Name of enterprise		
1.2	Name of enterprise's representative		
1.3	Email address of representative		
1.4	Contact numbers of representative	Tel:	Cell:
1.5	National Treasury Central Supplier Database Registration number	MAAA	
1.6	VAT registration number, if any:		
1.7	CIDB registration number, if any:		
1.8	Department of Labour: Registration number		
1.9	Department of Labour: Letter of Good Standing Certificate number		

**2.0 Particulars of sole proprietors and partners in partnerships (attach separate pages if more than 4 partners)**

	Full Name	Identity No.	Personal income tax No. *
2.1			
2.2			
2.3			

**3.0 Particulars of companies and close corporations**

3.1	Company registration number, if applicable:	
3.2	Close corporation number, if applicable:	
3.3	Tax Reference number, if any:	
3.4	South African Revenue Service: Tax Compliance Status PIN:	

**4.0** **MBD 4, MBD 6, MBD 8, and MBD9** issued by National Treasury must be completed for each tender and be included as a tender requirement.

**Tenderers are to include, at the back of their tender submission, a printout of their SARS "Tax Compliance Status – PIN Issued" certificate.**

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

- i) authorizes the Employer to verify the Tenderer's tax clearance status from the South African Revenue Services that it is in order.
- ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004.
- iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption.
- iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the Tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest.
- v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.2 CERTIFICATE OF ATTENDANCE AT CLARIFICATION MEETING / SITE INSPECTION**

Reference is to be made to the **Tender Data: C.2.1.1(a) and C.2.7.**

This is to certify that:

(entity name): .....

of (address): .....

was represented by the person(s) named below at the Clarification Meeting for Contract **32269-5W** held for all Tenderers, the details of which are stated in the **Tender Data: C.2.7.**

I / We acknowledge that the purpose of the meeting was to acquaint myself / ourselves with the site of the works and / or matters incidental to doing the work specified in the tender documents in order for me / us to take account of everything necessary when compiling our rates and prices included in the tender.

**Particulars of person(s) attending the meeting:**

Name: .....

Name: .....

Signature: .....

Signature: .....

Capacity: .....

Capacity: .....

**Attendance of the above person(s) at the meeting is confirmed by the Employer's Agent's Representative, namely:**

Name: .....

Signature: .....

Date: .....

**T2.2.3 MBD 4: DECLARATION OF INTEREST**

MSCM Regulations: **“in the service of the state”** means to be:

- (a) a member of:
  - (i) any municipal council.
  - (ii) any provincial legislature.
  - (iii) the national Assembly or the national Council of provinces.
- (b) a member of the board of directors of any municipal enterprise.
- (c) an official of any municipality or municipal enterprise.
- (d) an employee of any national or provincial department, national or provincial public enterprise 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 enterprise.
- (f) an employee of Parliament or a provincial legislature.

**“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.

- 1 No bid will be accepted from persons **in the service of the state**<sup>1</sup>.
- 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 and/or take an oath declaring his/her interest.
- 3 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

3.1 Name of enterprise

Name of enterprise’s representative

3.2 ID Number of enterprise’s representative

3.3 Position enterprise’s representative occupies in the enterprise

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 / sole proprietors / partners in partnerships, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below. In the case of a joint venture, information in respect of each partnering enterprise must be completed and submitted.

3.8 Are you presently in the service of the state?

Circle Applicable

YES

NO

If yes, furnish particulars: .....

.....

3.9 Have you been in the service of the state for the past twelve months?

YES

NO

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

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

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

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

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

If yes, furnish particulars: .....

.....

- 4 The names of all directors / trustees / shareholders / members / sole proprietors / partners in partnerships, their individual identity numbers and state employee numbers must be indicated below. In the case of a joint venture, information in respect of each partnering enterprise must be completed and submitted

Full Name	Identity No.	State Employee No.	Personal income tax No.
Use additional pages if necessary			

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

.....

**SIGNATURE:**

.....

.....

**T2.2.4 MBD 5: 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.

Circle Applicable		
	YES	NO
<p>1.0 Are you by law required to prepare annual financial statements for auditing?</p> <p>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.</p>		
<p>2.0 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?</p> <p>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.</p> <p>2.2 If YES, provide particulars.</p> <p>.....</p> <p>.....</p>	<p>YES</p>	<p>NO</p>
<p>3.0 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?</p> <p>3.1 If YES, provide particulars.</p> <p>SEE Returnable Document T2.2.5</p>	<p>YES</p>	<p>NO</p>
<p>4.0 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?</p> <p>4.1 If YES, provide particulars.</p> <p>.....</p> <p>.....</p>	<p>YES</p>	<p>NO</p>

**If required by 1.1 above, Tenderers are to include, at the back of their tender submission, a printout of their audited annual financial statements.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, and, if required, that the requested documentation has been included in the tender submission.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.5 CONTRACTS AWARDED BY ORGANS OF STATE IN THE PAST 5 YEARS**

In terms of SCM Policy Section 20(1)(d)(iii), Tenderers are to provide details of Works undertaken for the Government or Public Sector entities/ Organs of State in the past 5 Years, including particulars of any material non-compliance or dispute concerning the execution of such contract.

Material non-compliance or dispute (Yes or No)													
Date Completed													
Value of Work													
Consulting Engineer/Engineers representative													
Employer													
Contract Number													

*I, the undersigned, who warrants that they are authorised to sign on behalf of the entity, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.6 MBD 6.1: PREFERENCE POINTS CLAIM**

(SCMP 52.7: Basket of Preference Goals)

This form serves as a claim form for preference points according to **The Basket of Preference Goals. Reference is to be made to the Tender Data: C.3.11.**

**1.0 GENERAL CONDITIONS**

- 1.1 The relevant **Preference Points System (80/20 or 90/10)** applicable to this bid is stated in the **Tender Data: C.3.11.**
- 1.2 Failure on the part of the Tenderer to submit the required proof or documentation, in terms of the requirements in the Tender Data for claiming specific goal preference points, will be interpreted that **Preference Points for Specific Goals** are not claimed.
- 1.3 The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the purchaser.

**2.0 ADJUDICATION USING A POINT SYSTEM**

- 2.1 The bidder obtaining the highest number of total points will be recommended for the award of the contract.
- 2.2 Preference points shall be calculated after prices have been brought to a comparative basis taking into account all factors of non-firm prices and all unconditional discounts.
- 2.3 Points scored will be rounded off to the nearest 2 decimal places.
- 2.4 In the event that two or more bids have scored equal total points, the successful bid must be the one scoring the highest number of preference points for B-BBEE.
- 2.5 However, when functionality is part of the evaluation process and two or more bids have scored equal points including equal preference points for B-BBEE, the successful bid must be the one scoring the highest score for functionality.
- 2.6 Should two or more bids be equal in all respects the award shall be decided by the drawing of lots.

**3.0 POINTS AWARDED FOR PRICE**

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

**80/20 Procurement System**

$$P_s = 80 \left( 1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$$

Where:

$P_s$	=	Points scored for comparative price of bid under consideration
$P_t$	=	Comparative price of bid under consideration
$P_{\min}$	=	Comparative price of lowest acceptable bid

#### 4.0 POINTS ALLOCATED FOR THE BASKET OF PREFERENCE GOALS

4.1 Preference points may be claimed for the **Specific Goals** stated in the **Tender Data: C.3.11**.

For the purposes of this tender, the Tenderer may claim points based on the goal(s) stated in the table below, as supported by proof/ documentation specified in the Tender Data.

<b>80/20 Preference Points System</b> The Specific Goals to be allocated points in terms of this tender:	<b>Maximum Number of points ALLOCATED</b>	<b>Tenderer's Number of points CLAIMED</b>
<b>Ownership Goal:</b> Race (black)	4	
<b>Ownership Goal:</b> Gender (female)	4	
<b>Ownership Goal:</b> Disability	4	
<b>RDP Goal:</b> The promotion of enterprises located in a specific municipal area.	8	
<b>Total CLAIMED Points (maximum 20)</b>	<b>20</b>	

#### 5.0 REMEDIES FOR THE SUBMISSION OF FALSE INFORMATION

5.1 The remedies for the submission of false information regarding claims for specific goals are stated in the **SCM Policy: Section 52.9**.

**Tenderers are to include, at the back of their tender submission, the required proof/ documentation in support of their Preference Goal claims.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, and, if required, that the requested documentation has been included in the tender submission.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.7 MBD 8: DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES**

- 1.0 This Municipal Bidding Document must form part of all bids invited.
- 2.0 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.
- 3.0 The bid of any bidder may be rejected if that bidder, or any of its directors have:
- a) abused the municipal entity's supply chain management system or committed any improper conduct in relation to such system.
  - b) been convicted for fraud or corruption during the past five years.
  - c) wilfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years.
  - d) 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).
- 4.0 In order to give effect to the above, the following questions must be completed and submitted with the bid.

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 audi alteram partem rule was applied.)

The Database of Restricted Suppliers now resides on the National Treasury's website ([www.treasury.gov.za](http://www.treasury.gov.za)) and can be accessed by clicking on its link at the bottom of the home page.

Circle Applicable	
YES	NO

4.1.1 If YES, provide 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](http://www.treasury.gov.za)) by clicking on its link at the bottom of the home page.

YES	NO
-----	----

4.2.1 If YES, provide 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 YES, provide particulars.

.....

.....

- 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 YES, provide 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

4.5.1 If YES, provide particulars.

.....

.....

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both 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.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.8 MBD 9: CERTIFICATE OF INDEPENDENT BID DETERMINATION****NOTES**

- <sup>1</sup> Includes price quotations, advertised competitive bids, limited bids and proposals.
- <sup>2</sup> 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.
- <sup>3</sup> 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.

- 1.0 This Municipal Bidding Document (MBD) must form part of all **bids**<sup>1</sup> invited.
- 2.0 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**).<sup>2</sup> Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.
- 3.0 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:
- take all reasonable steps to prevent such abuse;
  - 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
  - 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.
- 4.0 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.
- 5.0 In order to give effect to the above, the below **Certificate of Independent Bid Determination** must be completed and submitted with the bid.

**CERTIFICATE OF INDEPENDENT BID DETERMINATION**

I, the undersigned, in submitting the accompanying bid for: Contract **32269-5W**

Trenance 3 Reservoir: The Construction of a 6 Mℓ Reinforced Concrete Reservoir, Pump Station, Inlet & Outlet Pipework, 400 Kℓ Elevated Tank and Ancillary Works: Ward 59

in response to the invitation for the bid made by: ETHEKWINI MUNICIPALITY

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

I certify, on behalf of: .....

that:

(continued on next page)

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.
  - (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<sup>3</sup> 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:
  - (a) prices.
  - (b) geographical area where product or service will be rendered (market allocation).
  - (c) methods, factors or formulas used to calculate prices.
  - (d) the intention or decision to submit or not to submit, a bid.
  - (e) the submission of a bid which does not meet the specifications and conditions of the bid.
  - (f) 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.
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.

NAME (Block Capitals):

Date

SIGNATURE:

**T2.2.9 DECLARATION OF MUNICIPAL FEES**

Reference is to be made to the **Tender Data: C.2.23 and C.3.13(a)**.

I, the undersigned, do hereby declare that the Municipal fees of:

.....  
(full name of Company / Close Corporation / partnership / sole proprietary/Joint Venture)

(hereinafter referred to as the TENDERER) are, as at the date hereunder, fully paid or an Acknowledgement of Debt has been concluded with the Municipality to pay the said charges in instalments.

The following account details relate to property of the said TENDERER:

<u>Account</u>	<u>Account Number: to be completed by Tenderer</u>											
Consolidated Account												
Electricity												
Water												
Rates												
JSB Levies												
Other												

- If applicable, a copy of a recent (within the past 3 months) Metro Bill is to be provided.

I acknowledge that should the aforesaid Municipal charges fall into arrears, the Municipality may take such remedial action as is required, including termination of any contract, and any payments due to the Contractor by the Municipality shall be first set off against such arrears.

- Where the Tenderer's place of business or business interests are outside the jurisdiction of eThekweni municipality, a copy of the accounts/ agreements from the relevant municipality are to be provided.
- Where the Tenderer's Municipal Accounts are part of their lease agreement, then a copy of the agreement, or an official letter to that effect, is to be provided.
- Where a Tenderer's place of business or business interests are carried out from premises as part of any other agreement, then a copy of the agreement, or an official letter to that effect, is to be provided.

**Tenderers are to include, at the back of their tender submission, copies of the above-mentioned account's, agreements signed with the municipality, lease agreements, or official letters.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, **and that the requested documentation has been included in the tender submission.***

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.10 CONTRACTOR'S HEALTH AND SAFETY DECLARATION**

Reference is to be made to Clauses C.2.1(e) and C.2.23 of the Tender Data.

In terms of Clause 5(1)(h) of the OHSA 1993 Construction Regulations 2014 (referred to as "the Regulations" hereafter), a Principal Contractor may only be appointed to perform construction work if the Client is satisfied that the Principal Contractor has the necessary competencies and resources to carry out the work safely in accordance with the Occupational Health and Safety Act No 85 of 1993 and the OHSA 1993 Construction Regulations 2014.

To that effect, a person duly authorised by the Tenderer, must complete and sign the declaration hereafter in detail.

**Declaration by Tenderer**

- 1 I, the undersigned, hereby declare and confirm that I am fully conversant with the Occupational Health and Safety Act No 85 of 1993 (as amended by the Occupational Health and Safety Amendment Act No 181 of 1993), and the OHSA 1993 Construction Regulations 2014.
- 2 I hereby declare that my company has the competence and the necessary resources to safely carry out the construction work under this contract in compliance with the Construction Regulations and the Employer's Health and Safety Specifications.
- 3 I propose to achieve compliance with the Regulations by one of the following **(Tenderers are to Circle Applicable - Yes or No)**:

(a) From my own competent resources as detailed in 4(a) hereafter.

(b) From my own resources still to be appointed or trained until competency is achieved, as detailed in 4(b) hereafter:

(c) From outside sources by appointment of competent specialist Subcontractors as detailed in 4(c) hereafter:

Circle Applicable	
Yes	No
Yes	No
Yes	No

- 4 Details of resources I propose:

*(Note: Competent resources shall include safety personnel such as a construction supervisor and construction safety officer as defined in Regulation 8, and competent persons as defined in Regulations 9, 10, 11, 12, 13, 14, 16, 17, 20, 21, 22, 23(1), 24, 25, 26, 27, 28 and 29, as applicable).*

- (a) Details of the competent and qualified key persons from my company's own resources, who will form part of the contract team:

NAMES OF COMPETENT PERSONS	POSITIONS TO BE FILLED BY COMPETENT PERSONS

(b) Details of training of persons from my company's own resources (or to be hired) who still have to be trained to achieve the necessary competency:

(i) By whom will training be provided?

(ii) When will training be undertaken?

(iii) Positions to be filled by persons to be trained or hired:


(c) Details of competent resources to be appointed as subcontractors if competent persons cannot be supplied from own company:

Name of proposed subcontractor:

Qualifications or details of competency of the subcontractor:


- 5 I, the undersigned, hereby undertake, if this tender is accepted, to provide, before commencement of the works under the contract, a suitable and sufficiently documented Health and Safety Plan in accordance with Regulation 7(1) of the Construction Regulations, which plan shall be subject to approval by the Client.
- 6 I, the undersigned, confirm that copies of this company's approved Health and Safety Plan, the Client's Safety Specifications as well as the OHSA 1993 Construction Regulations 2014 will be provided on site and will at all times be available for inspection by the Principal Contractor's personnel, the Client's personnel, the Employer's Agent, visitors, and officials and inspectors of the Department of Labour.
- 7 I, the undersigned, hereby confirm that adequate provision has been made in the tendered rates and prices in the Bill of Quantities to cover the cost of all resources, actions, training and all health and safety measures envisaged in the OHSA 1993 Construction Regulations 2014, and that I will be liable for any penalties that may be applied by the Client in terms of the said Regulations (Regulation 33) for failure on the Principal Contractor's part to comply with the provisions of the Act and the Regulations.
- 8 I, the undersigned, agree that failure to complete and execute this declaration to the satisfaction of the Client will mean that this company is unable to comply with the requirements of the OHSA 1993 Construction Regulations (2014) and accept that this tender will be prejudiced and may be rejected at the discretion of the Client.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

\_\_\_\_\_

.....

.....

**T2.2.11 CSD REGISTRATION REPORT**

Reference is to be made to **Tender Data: C.2.1.1(b) and C.2.23**.


The **Tender Data: C.2.1: Eligibility**, requires a Tenderer to be registered, at the time of tender closing, on the **National Treasury Central Supplier Database (CSD)** as a service provider.

The date of obtaining the printout is to be printed on the printout.

CSD Registration Reports can be obtained from the National Treasury's CSD website at <https://secure.csd.gov.za/Account/Login>.

The following is an example of the printout obtained from the above website.

Note: the printout will contain more than one page.

 <b>CENTRAL SUPPLIER DATABASE</b> FOR GOVERNMENT	Report Date:	
	Report Ran By:	
<b>CSD REGISTRATION REPORT</b>		
<b>SUPPLIER IDENTIFICATION</b>		
Supplier number		Have Bank Account
Is supplier active?		Total annual turnover
Supplier type		Financial year start date
Supplier sub-type		Registration date
Legal name		Created by
Trading name		Created date
Identification type		Edit by
Government breakdown		Edit date
Business status		Restricted Supplier
Country of origin		Restriction Last Verification Date
South African company/CC registration number		

**Tenderers are to include, at the back of their tender submission, a printout of their CSD Registration Report.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, and that the requested documentation has been included in the tender submission.*

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_

## T2.2.12 CIDB REGISTRATION AND STATUS

Reference is to be made to the **Tender Data: C.2.1.2, C.2.23, and C.3.13(c).**

The **Tender Data: C.2.1.1: Eligibility**, requires a Tenderer to be registered, as “Active”, with the CIDB (at time of tender closing), in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered, or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations.

The required class of construction work is specified in the **Tender Data: C.2.1.2.**

The date of obtaining the printout is to be printed on the printout.

CIDB Registrations can be obtained from the CIDB website at:

<https://portal.cidb.org.za/RegisterOfContractors/>

The following is an example of the printout obtained from the above website using the provided “Print” button. Note: the printout may contain more than one page.

**Tenderers are to include, at the back of their tender submission, a printout of their CIDB Registration and Status.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct, **and that the requested documentation has been included in the tender submission.***

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.13 JOINT VENTURES AGREEMENTS**

If this tender submission is to be made by an established Joint Venture, the Joint Venture Agreements and Power of Attorney Agreements are to be attached here.

Should the Joint Venture, at the time of submission, not yet be formalised, this form is to be completed in full and signed by all parties to the proposed Joint Venture.

The Lead Partner of the Joint Venture is to sign the **Form of Offer** in Section **C1.1.1**.

**INTENT TO FORM A JOINT VENTURE**

Should our submission for CONTRACT: **32269-5W** be successful, a Joint Venture will be established by the parties as listed below, as an unincorporated association, with the purposes of securing and executing the Contract, for the benefit of the Members.

**Proposed Joint Venture**

Joint Venture Title (name):

Represented by (name):

Tel:

**Lead Partner/ Member 1**

Entity Name:

Ownership Interest in JV %:

CSD Registration:

CIDB #:

Represented by (name):

Signature:

**Partner/ Member 2**

Entity Name:

Ownership Interest in JV %:

CSD Registration:

CIDB #:

Represented by (name):

Signature:

**Partner/ Member 3**

Entity Name:

Ownership Interest in JV %:

CSD Registration:

CIDB #:

Represented by (name):

Signature:

**Note:** All requirements for Joint Ventures, as stated elsewhere in this procurement document, must be complied with in full.

**T2.2.14 RECORD OF ADDENDA TO TENDER DOCUMENTS**

Reference is to be made to the **Tender Data: C.2.6.**

I / We confirm that the following communications received from the Employer or his representative before the date of submission of this tender offer, amending the tender documents, have been taken into account in this tender offer.

ADD.No	DATE	TITLE OR DETAILS
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

***It is also confirmed that the requirements, as stated on the Addenda, have been complied with.***

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_



**TO BE COMPLETED FOR EACH PROJECT THAT IS LISTED IN T2.2.15**

NAME OF CONTRACTOR: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

NAME OF EMPLOYER/CLIENT: \_\_\_\_\_

NAME AND DESCRIPTION OF PROJECT: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PROJECT START DATE: 

D	D	M	M	Y	Y
---	---	---	---	---	---

PROJECT COMPLETION DATE: 

D	D	M	M	Y	Y
---	---	---	---	---	---

PROJECT VALUE (INCL.VAT): \_\_\_\_\_

DID THE CONTRACTOR COMPLETE THE PROJECT BY THE DUE COMPLETION DATE? (IF NOT, WHY?)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

COMMENT AND RECOMMENDATION ON CONTRACTOR'S PERFORMANCE?

\_\_\_\_\_

\_\_\_\_\_

CHECK LIST (TICK IF APPLICABLE TO THIS PROJECT)

1. WAS THE RESERVOIR CONSTRUCTED WITH REINFORCED CONCRETE ?

2. WAS THE SIZE OF THE RESERVOIR GREATER THAN OR EQUAL TO 5ML ?

YES	NO

**CLIENT INFORMATION**

CONTACT PERSON: \_\_\_\_\_

DESIGNATION: \_\_\_\_\_

CONTACT NO.: \_\_\_\_\_

EMAIL ADDRESS: \_\_\_\_\_

COMPANY STAMP

--

I HEREBY DECLARE THAT THE ABOVE-MENTIONED INFORMATION IS A TRUE REFLECTION OF MY EXPERIENCE WITH THE CONTRACTOR ON THE SAID PROJECT.

\_\_\_\_\_  
SIGNATURE\_\_\_\_\_  
DATE

**T2.2.16 PROPOSED ORGANISATION and STAFFING**

The Tenderer should propose the structure and composition of their team i.e. the main disciplines involved, the key staff member / expert responsible for each discipline, and the proposed technical and support staff and site staff.

The roles and responsibilities of each key staff member / expert should be set out as job descriptions. In the case of an association / joint venture / consortium, it should, indicate how the duties and responsibilities are to be shared.

The Tenderer must attach their organization and staffing proposals to this page. (this is to include both the on-site and off-site staffing resources used for this project)

In addition to any lists, this information should also be shown in an organogram format (flow chart) clearly indicating the staff hierarchy and reporting lines, again for on- and off-site resources.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.17    KEY PERSONNEL**

The Tenderer shall list below the personnel which he intends to utilize on the Works, including key personnel (Contract's Manager, Construction Manager, and Foremen) which may have to be brought in from outside if not available locally.

CATEGORY OF EMPLOYEE	NUMBER OF PERSONS	
	KEY PERSONNEL, PART OF THE CONTRACTOR'S ORGANISATION	KEY PERSONNEL TO BE IMPORTED IF NOT AVAILABLE LOCALLY
Contracts Manager**		
Construction Manager**		
Concrete Lead Foreman**		
Civil Lead Foreman**		
Others: .....		
.....		
.....		
.....		
.....		
.....		
.....		

Note: CVs of key personnel may be requested during the contract period.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**T2.2.18 EXPERIENCE OF KEY PERSONNEL**

The experience of assigned staff member in relation to the Scope of Work will be evaluated from three different points of view:

- 1) Relevant experience (total duration of professional activity), level of education and training and positions held of each discipline specific team leader.
- 2) The education, training, skills and experience of the Assigned Staff in the specific sector, field, subject, etc which is directly linked to the scope of work.
- 3) The key staff members' / experts' knowledge of issues which the Tenderer considers pertinent to the project e.g. local conditions, affected communities, legislation, techniques etc.

**A CV of each key personnel of not more than 4 pages should be attached to this schedule:**

Each CV should be structured under the following headings:

<b>Full Name &amp; Surname:</b>			
<b>Tendered Post:</b>			
<b>ID/ Passport No.:</b>		<b>Age:</b>	
<b>Name of Tertiary Institution Attended:</b>			
<b>Relevant Qualification/s Obtained (and year):</b>			
<b>Name of Professional Institution Registered With:</b>			
<b>Registration No.:</b>			
<b>EMPLOYMENT HISTORY</b>			
<b>(To be listed in chronological order with reference to relevant experience only)</b>			
<b>Project Duration (MM/YY to MM/YY)</b>	<b>Name of Employer</b>	<b>Project Details</b>	<b>Responsibility (e.g. Contracts Manager)</b>
		Project Name: Reservoir Size: Reservoir Material:	
<b>Total number of years of relevant experience:</b>			
<b>Declaration</b>			
<p>I , _____ (Name and Surname), ID Number _____ , confirm that I would be involved in the execution of the work as per the nominated position and carry out the duties throughout the project. If circumstances change the company would notify the Employer and a suitable Employer approved replacement will be made available.</p> <p>The undersigned, which warrants that he / she confirms that the contents of information within the CV are both true and correct.</p> <p>Sign _____ Date _____</p>			

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):** \_\_\_\_\_

**Date** \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_



**T2.2.20 CONSTRUCTION APPROACH, METHODOLOGY, AND QUALITY CONTROL**Construction Approach and Methodology

The construction approach and methodology must respond to the Scope of Work and outline the proposed approach to undertake the work showing a detailed programme including health and safety aspects, the use of plant and resources for this Project.

Quality Control

The quality control statement must discuss what tests and control measures are to be employed on site to attain the specified results and is to cover the program associated activities.

**The Tenderer must attach their Construction Methodology and Quality Control information to this page.**

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):****Date****SIGNATURE:**



**T2.2.22 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 if my / our tender is accepted.

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

DESCRIPTION (type, size, capacity etc)	QUANTITY	YEAR OF MANUFACTURE

*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 accepted**

DESCRIPTION (type, size, capacity etc)	QUANTITY	HOW ACQUIRED	
		HIRE/ BUY	SOURCE

*Attach additional pages if more space is required*

The Tenderer undertakes to bring onto site without additional cost to the Employer any additional plant not listed but which may be necessary to complete the contract within the specified contract period.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):** \_\_\_\_\_

**Date**

**SIGNATURE:** \_\_\_\_\_

**T2.2.23 CONTRACTOR'S HEALTH AND SAFETY PLAN**

At tender stage only a brief overview (**to be attached to this page**) of the Tenderers perception on the safety requirements for this contract will be adequate.

Only the successful Tenderer shall submit separately the Contractor's Health and Safety Plan as required in terms of Regulation 7 of the Occupational Health and Safety Act 1993 Construction Regulations 2014.

The detailed safety plan will take into consideration the site specific risks as mentioned under C.3: Project Specification. A generic plan will not be acceptable.

*I, the undersigned, who warrants that they are authorised to sign on behalf of the Tenderer, confirms that the information contained in this form is within my personal knowledge and is to the best of my belief both true and correct.*

**NAME (Block Capitals):**

**Date**

**SIGNATURE:**

**PART C1: AGREEMENT AND CONTRACT DATA****C1.1: FORM OF OFFER AND ACCEPTANCE****C1.1.1: OFFER**

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

Contract No: **32269-5W**

Contract Title: **Trenance 3 Reservoir: The Construction of a 6 Mℓ Reinforced Concrete Reservoir, Pump Station, Inlet & Outlet Pipework, 400 Kℓ Elevated Tank and Ancillary Works: Ward 59**

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

**\* The offered total of the prices inclusive of Value Added Tax is:**

R..... (In words .....)  
.....)

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:**

\* **Name of Tenderer** (organisation) : .....

\* **Signature** (of person authorized to sign the tender) : .....

\* **Name** (of signatory in capitals) : .....

**Capacity** (of Signatory) : .....

**Address** : .....

: .....

**Telephone** : .....

**Witness:**

**Signature** : ..... **Date** : .....

**Name** (in capitals) : : .....

**Notes:**

\* **Indicates what information is mandatory.**

**Failure to complete the mandatory information and sign this form will invalidate the tender.**

**C1.1: FORM OF OFFER AND ACCEPTANCE****C1.1.2: FORM OF ACCEPTANCE****This Form will be completed by the Employer**

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

The terms of the contract are contained in:

- Part C1 : Agreement and Contract Data, (which includes this Agreement)
- Part C2 : Pricing Data, including the Bill of Quantities
- Part C3 : Scope of Work
- Part C4 : Site Information

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

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto 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 representatives 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 at, or just after, the date this Agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

Notwithstanding anything contained herein, this Agreement comes into effect on the date when the Tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any). Unless the Tenderer (now Contractor) within five 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.

**Signature** (*person authorized to sign the acceptance*) : .....

**Name** (*of signatory in capitals*) : .....

**Capacity** (*of Signatory*) : .....

**Name of Employer** (*organisation*) : .....

**Address** : .....

: .....

**Witness:**

**Signature** : ..... **Date** : .....

**Name**(*in capitals*) : : .....

**C1.1: FORM OF OFFER AND ACCEPTANCE**  
**C1.1.3: SCHEDULE OF DEVIATIONS**

**This form will be completed by THE EMPLOYER and ONLY THE SUCCESSFUL TENDERER**

1.   **Subject**       : .....
- Details**       : .....
- : .....
2.   **Subject**       : .....
- Details**       : .....
- : .....
3.   **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 change to the terms of the offer agreed by the Tenderer and the Employer during this process of offer and acceptance.

**FOR THE TENDERER**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Signature

Name (*in capitals*)

Capacity

Name and Address of

Organisation

Witness Signature

Witness Name

Date

**FOR THE EMPLOYER**

.....

.....

.....

.....

.....

.....

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## C1.2: CONTRACT DATA

### C1.2.1 CONDITIONS OF CONTRACT

#### C1.2.1.1 GENERAL CONDITIONS OF CONTRACT

The Conditions of Contract are the General Conditions of Contract for Construction Works (2015 3<sup>rd</sup> Edition), (GCC 2015) published by the South African Institution of Civil Engineering. Copies of these conditions of contract may be obtained from the South African Institution of Civil Engineering (Tel: 011-805-5947, Fax: 011-805-5971, E-mail: [civilinfo@saice.org.za](mailto:civilinfo@saice.org.za)).

The Contract Data (including variations and additions) shall amplify, modify, or supersede, the GCC 2015 to the extent specified below, and shall take precedence and shall govern.

Each item of data given below is cross-referenced to the clause in the GCC 2015 to which it mainly applies.

### C1.2.2 CONTRACT DATA

#### C1.2.2.1 DATA TO BE PROVIDED BY THE EMPLOYER

- 1.1.1.13 The **Defects Liability Period**, from the date of the Certificate of Completion, is **1 Year**.
- 1.1.1.14 The **time for achieving Practical Completion**, from the Commencement Date is **490 Days**. The period as stated in 5.3.2, and the 7 days referred to in 5.3.3, are included in the above time for achieving Practical Completion. The special non-working days as stated in 5.8.1 are included in the above time for achieving Practical Completion.
- 1.1.1.15 The Employer is the eThekweni Municipality as represented by:  
Deputy Director: **Water and Sanitation Engineering**
- 1.2.1.2 The address of the Employer is:  
Physical: No. 3 Prior Road, Durban, 4001  
Postal: P.O. Box 1038, Durban, 4000  
Telephone: 031-311-8602 (t)  
Fax: 031-311-8747 (f)  
E-Mail: [Bhavna.Soni@durban.gov.za](mailto:Bhavna.Soni@durban.gov.za)
- 1.1.1.16 The **name of the Employer's Agent** is **Terence Thumbaya**
- 1.2.1.2 The address of the Employer' Agent is:  
Physical: No 5 The Boulevard, Westway Office Park, 7 Harry Gwala Road, Westville, 3635  
Postal: N/A  
Telephone: 031 265 6007 (t)  
Fax: 031 265 6011 (f)  
E-Mail: [Terence.Thumbaya@naiduconsulting.com](mailto:Terence.Thumbaya@naiduconsulting.com)
- 1.1.1.26 The **Pricing Strategy** is by **Re-measurement Contract**.
- 3.2.3 The Employer's Agent shall obtain the **specific approval of the Employer** before executing any of his functions or duties according to the following Clauses of the General Conditions of Contract:
- 6.3: Council approval in order to authorise any expenditure in excess of the Tender Sum plus **15%** contingencies.
- 4.11.1 The requirements for the Contracts Manager, Construction Manager, Concrete Foreman and Civils Foreman can be found in section T1.2.3.4. If any of the resources proposed by the

Contractor at the tender stage become unavailable or are otherwise changed during the course of the Contract, the Contractor shall, at its own cost, propose a suitable replacement resource. Such replacement shall be subject to the Employer's prior written approval and shall have equal to or better experience and qualifications than the resources proposed at tender stage.

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 (refer to Clause 6.2)
- Insurance (refer to Clause 8.6)
- CV(s) of Key Site Staff (refer to Clause 4.11.1)
- CPG Implementation Plan (if applicable)

5.3.2 The **time to submit the documentation** required before commencement with Works is **28 Days**.

5.3.3 Add the following paragraph:

"If a construction work permit, in terms of Clause 3(1) of the Construction Regulations (2014), is applicable, the instruction to commence carrying out of the works may only be issued once the construction work permit has been obtained by the Employer's Agent. If a construction work permit is applicable, the contractor shall allow for a minimum period of 37 days, after the submission (or re-submission) of the documentation referred to in Clause 5.3.1., for the issuing of the construction work permit."

5.4.2 The access and possession of Site shall not be exclusive to the Contractor. The Employer shall grant the Contractor access to the reservoir site to perform the required construction and commissioning activities (including the Trial Operation Period), whilst ensuring the continuity of the Employer's operational activities. Access arrangements shall be shared and coordinated to facilitate the Contractor's work without compromising the operational integrity of the treatment works.

The Employer is responsible for:

- a) Ensuring that reasonable access is provided to the Contractor for the execution of the works, in accordance with the agreed schedule.
- b) Communicating any operational constraints or specific requirements that may impact the Contractor's activities.
- c) Communicating with the Contractor to address potential conflicts between operational activities and construction works.

The Contractor is responsible for:

- i) Adhering to the Employer's access protocols, operational constraints, and safety requirements while on-site.
- ii) Scheduling and executing work to minimize interference with the Employer's ongoing operations.
- iii) Maintaining open communication with the Employer to ensure the smooth coordination of shared access.
- iv) Any conflicts or delays arising from shared access arrangements shall be resolved through mutual consultation to ensure progress while maintaining the treatment works' operational functionality.
- v) Coordinating with the Employer to address potential conflicts between operational activities and construction works.
- vi) Holding ongoing coordination meetings at an interval agreed with the Employer

5.8.1 The **non-working days** are **Saturdays and Sundays**.

- (5.1.1) The **special non-working** days are:
- All statutory holidays as declared by National or Regional Government.
  - The year-end break:
    - Commencing on the first working day after 15 December.
    - Work resumes on the first working day after 5 January of the next year.

5.8.1 Delete the words “sunset and sunrise” and replace with “17:00 and 07:00”.

5.12.2.2 **Abnormal Climatic Conditions (Rain Delays)** - The numbers of days per month, on which work is expected not to be possible as a result of rainfall, for which the Contractor shall make provision, is given in the table below. During the execution of the Works, the Employer's Agent's Representative will certify a day lost due to rainfall only if at least 75% of the work force and plant on site could not work during that specific working day.

Extension of time as a result of rainfall shall be calculated monthly being equal to the number days certified by the Employer's Agent's Representative as lost due to rainfall, less the number of days allowed for as in table below, which could result in a negative figure for certain months. The total extension of time for which the Contractor may apply, shall be the cumulative algebraic sum of the monthly extensions. Should the sum thus obtained be negative, the extension of time shall be taken as NIL.

<u>Month</u>	<u>Days Lost</u>	<u>Average Rainfall</u>	<u>Month</u>	<u>Days Lost</u>	<u>Average Rainfall</u>
January	4*	134	July	1	39
February	3	113	August	2	62
March	3	120	September	2	73
April	2	73	October	3	98
May	2	59	November	3	108
June	1	28	December	1*	102
TOTAL	27	1009mm	* = The number of working days lost allows for the annual statutory Construction holiday in December and January of each year.		

5.13.1 The **penalty for delay** in failing to complete the Works is **R 28000** (per Day).

5.14.1 The **requirements for achieving Practical Completion** will be determined by the Employer's Agent (in consultation with the Contractor) and recorded in the minutes of the first Site Meeting / Handover Meeting. (Refer to 1.1.1.24 for a generic definition.) The requirements are to be regularly reviewed with respect to any variations to the Contract.

5.16.3 The **latent defect liability** period is **10 Years**.

6.2.1 **Security (Performance Guarantee)**: Delete the word “selected” and replace it with “stated”.

The liability of the Performance Guarantee shall be as per the following table:

<b>Value of Contract (incl. VAT)</b>	<b>Performance Guarantee Required</b>
Less than or equal to R 1m	Nil
Greater than R 1m and less than or equal to R 10m	5% of the Contract Sum
Greater than R 10m	10% of the Contract Sum

- 6.5.1.2.3 The **percentage allowance** to cover overhead charges for daywork are as follows:
- **30%** of the gross remuneration of workmen and foremen actually engaged in the daywork;
  - **15%** on the net cost of materials actually used in the completed work.
  - **10%** on the net cost of plant actually used in the completed work.

No allowance will be made for work done, or for materials and equipment for which daywork rates have been quoted at tender stage.

- 6.8.2 **Contract Price Adjustment Factor:** The value of the certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule (GCC 2015 - page 86) with the following Indices / Descriptions / Coefficients:

- The proportion not subject to adjustment: **x = 0.10**.
- The base month will be the month prior to the month in which tenders close.
- The Index for, **Plant, Materials, and Fuel** shall be based on **2023 = 100**.
- The Index for **Labour** shall be based on **2024 = 100**.

	STATS SA Statistical Release	Table	Description	Coefficient
• "L" is the "Labour Index"	P0141	Table A	Geographic Indices; CPI per Province; Kwa-Zulu Natal	<b>a = 0.28</b>
• "P" is the • "Contractor's Equipment Index"	P0151.1	Table 4	Plant and Equipment	<b>b = 0.28</b>
• "M" is the "Materials Index"	P0151.1	Table 6	Civil Engineering Material (excluding bitumen)	<b>c = 0.38</b>
• "F" is the "Fuel Index"	P0142.1	Table 1	Coke, petroleum, chemical, rubber and plastic products; Coal and petroleum products; Diesel	<b>d = 0.06</b>

- 6.10.1.5 The **percentage advance** on materials not yet built into the Permanent Works is **80%**.

- 6.10.3 **Retention Money:** Delete the word "selected".

The percentage retention on the amounts due to the Contractor is 10%.

The limit of "retention money" is 5% of the Contract Sum.

Should the Contract Price exceed the Contract Sum then the limit of "retention money" is 5% of the Contract Price.

Interest will not be paid on retention withheld by the Employer.

- 8.6.1.1.2 The **value of Plant and materials** supplied by the Employer to be included in the insurance sum: **R 0.00**.

- 8.6.1.1.3 The **amount to cover professional fees** for repairing damage and loss to be included in the insurance sum: **Not Required**

- 8.6.1.2 **SASRIA Coupon Policy** for Special Risks to be issued in joint names of Council and Contractor for the full value of the works (including VAT).

- 8.6.1.3 The limit of indemnity for **liability insurance**: **R 30 000 000**.

- 8.6.1.4 **Ground Support Insurance:**

- Minimum amount for any one occurrence, unlimited as to the number of occurrences, against any claim for damages or loss caused by vibration and / or removal of lateral support: **R 10 000 000.00.**
- Maximum first excess: **R 20 000.00.**

8.6.1.5 Furthermore, the insurance cover effected by the Contractor shall meet the following requirements:

**Third Party Insurance (Public Liability)**

- Minimum amount for any one occurrence, unlimited as to the number of occurrences, for the period of the contract, inclusive of the maintenance period: **R 30 000 000.00.**
- Consequential loss to be covered by policy: **Yes**
- Liability section of policy to be extended to cover blasting: **Nil**
- Maximum excess per claim or series of claims arising out of any one occurrence: **R25 000.00.**

**Principal's own surrounding Property Insurance**

- Minimum amount for any one occurrence unlimited as to the number of occurrences against any claim for damage which may occur to the Council's own surrounding property: **R7 500 000.00.**
- Maximum first excess: **R 25 000.00.**

**Insurance of Works**

- Minimum amount for additional removal of debris (no damage): **R 5 000 000.00.**
- Minimum amount for temporary storage of materials off site, excluding Contractor's own premises: **R 3 000 000.00.**
- Minimum amount for transit of materials to site: **R 3 000 000.00.**

8.6.5 **Approval by Employer:** At the end of the sub-clause, add the following paragraph:

"Except where otherwise provided in the Special Conditions of Contract, the insurance cover effected by the Contractor in terms of this clause shall not carry a first loss amount greater than those set out below:

<b>Contract Price</b>	<b>First Loss</b>
Less than R 100,000	R 5,000
R 100,000 to R 500,000	R 10,000
R 500,000 to R 1,000,000	R 20,000
R 1,000,000 to R 2,000,000	R 30,000
R 2,000,000 to R 4,000,000	R 40,000
Greater than R 4,000,000	R 50,000

The insurance policy shall contain a specific provision whereby cancellation of the policy prior to the end of the period referred to in Cause 8.2.1 cannot take place without the prior written approval of the Employer. "

10.5.1 **Dispute resolution** shall be by ad hoc adjudication.

10.5.3 The **number of members** of the Adjudication Board to be appointed **will be determined by the Employer.**

10.7.1 Failing ad-hoc adjudication, the determination of disputes shall be by arbitration.

**C1.2.2.2 DATA TO BE PROVIDED BY CONTRACTOR**

1.1.1.9 The legal name of Contractor is:

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1.2.1.2 The Physical address of the Contractor is:

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The Postal address of the Contractor is:

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.....

.....

.....

The contact numbers of the Contractor are:

Telephone: .....

Fax: .....

The E-Mail address of the Contractor is:

.....

### C1.2.3 ADDITIONAL CONDITIONS OF CONTRACT

#### C1.2.3.1 COMMUNITY LIAISON OFFICER

The Ward Councillor(s) in whose ward(s) work is to be done will, collectively, identify a community liaison officer (CLO) for the project and make the person known to the Contractor within two days of being requested to do so. The Contractor will be required to enter a written contract with the CLO that specifies:

- The hours of work and the wage rate of the CLO (200% of the Civil Engineering Industry minimum wage).
- The duration of the appointment.
- The duties to be undertaken by the CLO which could include:
  - Assisting in all respects relating to the recruitment of local labour.
  - Acting as a source of information for the community and councillors on issues related to the contract.
  - Keeping the Contractor advised on community issues and issues pertaining to local security.
  - Assisting in setting up any meetings or negotiations with affected parties.
  - Keeping a written record of any labour or community issue that may arise.
  - Any other duties that may be required by the Contractor.

Responsibility for the identification of a pool of suitable labour shall rest with the CLO, although the Contractor shall have the right to choose from that pool. The Contractor shall have the right to determine the total number labourers required at any one time and this may vary during the contract.

The Contractor shall have the right to replace labour that is not performing adequately. Should such occasion arise, it must be done in conjunction with the CLO.

Payment: The CLO will be reimbursed from the PC Sum item in the Preliminary & General Section of the Bill of Quantities.

#### C1.2.3.2 EMPLOYMENT OF LOCAL LABOUR

It is a condition of contract that the contractor will be required to employ local labour as specified in eThekweni Council Policy "The use of CLOs and Local Labour". The contractor will be required to ensure that a minimum of 50% of the labour force is made up of local labour. For the purposes of this contract, "Local labour" will be deemed to be any **persons who reside within Ward(s) 59**. The contractor will be required to provide proof of authenticity of local labour. Signed confirmation by the appointed CLO will suffice for this.

No additional costs will be entertained due to this Particular Specification. The contractor will remain responsible for providing proper supervision of all labour and will be responsible for the quality of work produced.

#### C1.2.3.3 CONTRACTOR PARTICIPATION GOAL (CPG)

**It is a condition of the contract that the contractor must allow for a minimum of 30% of the contract value (excluding Provisional Sums, Time-Related and Fixed Costs, and Value Added Tax (VAT) to be subcontracted to contractors who are >51% BLACK owned. Proof of payment to the subcontractors will be required to verify that the minimum has been achieved.**

The penalty for not achieving the specified CPG will be 0.5% of the contract value (excluding PC Sum items and Fixed Cost allowances) for every 1% of CPG not achieved.

**C1.2.3.4 FTE (Full Time Equivalent) EMPLOYMENT INFORMATION**

It is a condition of contract that the Contractor supplies the Employer's Agent's Representative with information in respect of the employment of all foremen, artisans and Labour (skilled and unskilled) employed to work on this contract. The information required is:

- Initials (per ID doc)
- Last Name (per ID doc)
- ID Number
- Disability (y / n)
- Education Level

<b>Level 1</b> Unknown	<b>Level 2</b> No Schooling	<b>Level 3</b> Grade 1-3	<b>Level 4</b> Grade 4	<b>Level 5</b> Grade 5-6
<b>Level 6</b> Grade 7-8	<b>Level 7</b> Grade 9	<b>Level 8</b> Grade 10-11	<b>Level 9</b> Grade 12	<b>Level 10</b> Post Matric

- Category of Employment

<b>Category A:</b> Employed as Local Labour for this contract only <b>Category B:</b> Temporarily employed by the Contractor <b>Category C:</b> Permanently employed by the Contractor
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In addition, the following information is required in respect of each person listed above, on a monthly basis:

- Number of days worked during the month;
- Daily wage rate;
- Number of training days during the month.

The information is to be forwarded in a format acceptable to the Employer's Agent's Representative, but preferably in the form of an emailed EXCEL file (an original file, to be used as a template, will be issued to the Contractor). Contractors without computer facilities will be required to submit a hard copy of the information in a format as agreed to between the Contractor and the Employer's Agent's Representative.

In addition to the tax invoice, to be submitted by the Contractor with his monthly statement, mentioned in Clause 6.10.4 of GCC 2015, the Employer reserves the right to withhold payment until the monthly FTE information has been forwarded to the Employer's Agent's Representative. No additional payment for complying with the above will be made and the Contractor is to make allowance for complying through the time related P & G items (sum) under Part AA: Preliminaries, of the Bill of Quantities.

**C1.2.3.5 PERFORMANCE MONITORING OF SERVICE PROVIDERS**

[For contract awards over R10m] The Contractor shall be subjected to "Performance Monitoring" assessments in terms of the applicable Section (S.53) of the Employer's Supply Chain Management Policy.

Key Performance Indicators (KPIs) are specified in the C3: Scope of Works, or will be discussed and agreed with the Contractor before commencement of the contract.

**C1.2.3.6 EXCEPTED RISKS (Clause 8.3)**

Pursuant to Clause 8.3 of the Conditions of Contract (GCC 2015), the Employer shall not be liable for the payment of standing time costs as a result of the occurrence of any of the "Excepted Risks" as defined under Clause 8.3.

However, the Employer shall reimburse the Contractor in respect of plant de-establishment and re-establishment costs as a result of "Excepted risks" when a written instruction to de-establish is issued to the Contractor.

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**C1.2.3.7 CIDB B.U.I.L.D. PROGRAMME****a) CIDB Skills Standard**

It will be a condition of contract that the Contractor shall, in the performance of the contract, achieve the **Contract Skills Development Goal** (CSDG) established in the below referenced standard:

- CIDB Standard for Developing Skills Through Infrastructure Contracts, published in Gazette Notice No. 48491 of 28 April 2023.

**b) CIDB Indirect Targeting Standard**

It will be a condition of contract that the Contractor shall, in the performance of the contract, achieve the **Contract Participation Goal** (CPG) relating to the engagement of targeted enterprises as established in the below referenced standard:

- CIDB Standard for Indirect Targeting for Enterprise Development through Construction Works Contracts, published in Gazette Notice No. 36190 of 25 February 2013.

**C1.2.3.8 SHUTS CANCELLED/ABORTED BY CONTRACTOR**

The Contractor is required to provide 7 days notice to the Employers Agent prior to any postponement or cancellation of the shutdown for any reason within the Contractors control. The penalty for failure to notify the Employer's Agent of any cancellation or postponement 7 days prior to any planned shutdown is R10 000.00.

## **C2.1: PRICING ASSUMPTIONS / INSTRUCTIONS**

### **C2.1.1 GENERAL**

The Bill of Quantities forms part of the Contract Documents and must be read and priced in conjunction with all the other documents comprising the Contract Documents (refer to C.1.2 of the Tender Data).

### **C2.1.2 PRICING INSTRUCTIONS AND DESCRIPTION OF ITEMS IN THE SCHEDULE**

Measurement and payment shall be in accordance with the relevant provisions of Clause 8 of each of the Standard Engineering Specifications referred to in the Scope of Work. The Preliminary and General items shall be measured in accordance with the provisions of C2.1.8.

The descriptions of the items in the Bill of Quantities are for identification purposes only and comply generally with those in the Standard Engineering Specification.

Clause 8 of each Standard Engineering Specification, read together with the relevant clauses of the Scope of the works, set out what ancillary or associated work and activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standard Engineering Specification, or the Scope of the works, conflict with the Bill of Quantities, the requirements of the Standard Engineering Specification or Scope of the work, as applicable, shall prevail.

### **C2.1.3 QUANTITIES REFLECTED IN THE SCHEDULE**

The quantities given in the Bill of Quantities are estimates only, and subject to re-measuring during the execution of the work. The Contractor shall obtain the Employer's Agent's detailed instructions for all work before ordering any materials or executing work or making arrangements for it.

The Works as finally completed in accordance with the Contract shall be measured and paid for as specified in the Bill of Quantities and in accordance with the General and Special Conditions of Contract, the Specifications and Project Specifications and the Drawings. Unless otherwise stated, items are measured

net in accordance with the Drawings, and no allowance has been made for waste.

The validity of the contract will in no way be affected by differences between the quantities in the Bill of Quantities and the quantities finally certified for payment.

### **C2.1.5 MONTHLY PAYMENTS**

Unless otherwise specified in the Specifications and Project Specifications, progress payments in Interim Certificates, referred to in Clause 6.10.1 of the General Conditions of Contract, in respect of "sum" items in the Bill of Quantities shall be by means of interim progress instalments assessed by the Employer's Agent and based on the measure in which the work actually carried out relates to the extent of the work to be done by the Contractor.

### **C2.1.4 PROVISIONAL SUMS / PRIME COST SUMS**

Where Provisional Sums or Prime Cost sums (PC Sum) are provided for items in the Bill of Quantities, payment for the work done under such items will be made in accordance with Clause 6.6 of the General Conditions of Contract. The Employer reserves the right, during the execution of the works, to adjust the stated amounts upwards or downwards according to the work actually done under the item, or the item may be omitted altogether, without affecting the validity of the Contract.

The Tenderer shall not under any circumstances whatsoever delete or amend any of the sums inserted in the "Amount" column of the Bill of Quantities and in the Summary of the Bill of Quantities unless ordered or authorized in writing by the Employer before closure of tenders. Any unauthorized changes made by the Tenderer to provisional items in the schedule, or to the provisional percentages and sums in the Summary of the Bill of Quantities, will be treated as arithmetical errors.

### **C2.1.6 PRICING OF THE BILL OF QUANTITIES**

The prices and rates to be inserted by the Tenderer in the Bill of Quantities shall be the full inclusive prices to be paid by the Employer for the work described under

the several items, and shall include full compensation for all costs and expenses that may be required in and for the completion and maintenance during the defects liability period of all the work described and as shown on the drawings as well as all overheads, profits, incidentals and the cost of all general risks, liabilities and obligations set forth or implied in the documents on which the Tender is based.

Each item shall be priced and extended to the "Total" column by the Tenderer, with the exception of the items for which only rates are required (Rate Only), or items which already have Prime Cost or Provisional Sums affixed thereto. If the Contractor omits to price any items in the Bill of Quantities, then these items will be considered to have a nil rate or price.

All items for which terminology such as "inclusive" or "not applicable" have been added by the Tenderer will be regarded as having a nil rate which shall be valid irrespective of any change in quantities during the execution of the Contract.

All rates and amounts quoted in the Bill of Quantities shall be in Rands and Cents and shall include all levies and taxes (other than VAT). VAT will be added in the Summary of the Bill of Quantities.

#### **C2.1.7 "RATE ONLY" ITEMS**

The Tenderer shall fill in rates for all items where the words "Rate Only" appear in the "Total" column. "Rate Only" items have been included where:

- (a) an alternative item or material is contemplated;
- (b) variations of specified components in the make-up of a pay item may be expected; and
- (c) no work under the item is foreseen at tender stage but the possibility that such work may be required is not excluded.

For "Rate Only" items no quantities are given in the "Quantity" column but the quoted rate shall apply in the event of work under this item being required. The Tenderer shall however note that in terms of the Tender Data the Tenderer may be asked to reconsider

any such rates which the Employer may regard as unbalanced.

#### **C2.1.8 PRELIMINARY AND GENERAL**

The Preliminary and General Section is provided to cover the Contractor's expenses incurred in complying with the requirements of the tender documents and consists of the following parts:

- Part AA: Preliminaries
- Part AB: General Specifications
- Part AH: Occupational Health and Safety

**Fixed Charge Items:** Each item should be priced separately and, subject to the Engineer certifying in terms of Clause 6.7 of the General Conditions of Contract that the work has been done, payment will be made as follows:

- (i) the total amount due when the certified value fixed charge items in this section is less than 5% of the net contract price;
- (ii) when the certified value of fixed charge items in this section is greater than 5% of the net contract price, payment will be limited to 5% of the net contract price. The remainder will be paid when the value of the work done under the contract, excluding the value of fixed charge items in this section, is greater than 50% of the net contract price, excluding the value of fixed charge items in this section.

**Time Related Items:** Any Time Related items not priced shall be deemed to be covered by the prices of other items in the section.

Payment of Time Related items in this section will be made throughout the contract period, the amount per month being the value of the item divided by the completion in months or, if specified in weeks, the equivalent number of months, in terms of Clause 5.5 of the General Conditions of Contract. The final monthly increment will only be paid upon the issue of a completion certificate. Time related items will not be paid for special non-working days as defined in clause 5.1.1.

## **C2.2: BILL OF QUANTITIES**

The Bill of Quantities follows and comprises of 61 pages. The pages are numbered 75 to 135

**SCHEDULE 1:**  
**PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
1	<b>SABS 1200 A</b>	<b>PRELIMINARY AND GENERAL</b>				
	<b>8.3</b>	<b>FIXED-CHARGE AND VALUE RELATED ITEMS</b>				
1.1	8.3.1	Contractual Requirements	Sum	1.00		
	8.3.2.1	Establish facilities on the site for Engineer (SABS 1200 AB):				
1.2	8.3.2.1 (a) PSAB 3.2	Furnished offices (2 No.)	Sum	1.00		
1.3	8.3.2.1 (b)	Telephone for Engineer	Sum	1.00		
1.4	PSAB 3.2	Meeting room facilities	Sum	1.00		
1.5	8.3.2.1 (c) PSAB 3.1	Project name boards (2 No.). Refer C4.3 for details.	Sum	1.00		
	8.3.2.2	Establish facilities on the site for Contractor:				
1.6	8.3.2.2 (a)	a) Offices & storage sheds	Sum	1.00		
1.7	8.3.2.2 (e)	b) Ablution & latrine facilities	Sum	1.00		
1.8	8.3.2.2 (f)	c) Tools & equipment	Sum	1.00		
1.9	8.3.2.2 (g)	d) Water supplies, electric power and communications	Sum	1.00		
1.10	8.3.2.2 (h)	e) Dealing with water	Sum	1.00		
1.11	8.3.2.2 (i)	f) Access	Sum	1.00		
1.12	8.3.3	Other fixed-charge obligations	Sum	1.00		
1.13	PSA 8.3.4	Removal of site establishment	Sum	1.00		
1.14	PSA 8.3.5	Re-establishment on site	Sum	1.00		
	<b>PSOH</b>	<b><u>Occupational Health and Safety</u></b>				
1.15		General safety (Fixed charges)	Sum	1.00		
1.16		Health & safety plan	Sum	1.00		
		Allow for the following additional items which the tenderer requires to be priced separately				
1.17		a)	Sum	1.00		
1.18		b)	Sum	1.00		
1.19		c)	Sum	1.00		
Total Carried Forward						

**SCHEDULE 1:****PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.20	PEM, PS 4.12	Environmental Management Plan Obligations	Sum	1.00		
1.21		Site security for the duration of the contract	Sum	1.00		
	<b>8.4</b>	<b>TIME-RELATED ITEMS</b>				
1.22	8.4.1	Contractual requirements	Days	490		
	8.4.2.1	Facilities for Engineer for duration of construction (SABS 1200 AB):				
1.23	8.4.2.1 (a) PSAB 3.2	Furnished offices (2 No.)	Days	490		
1.24	PSAB 5.4	Telephone for Engineer	Days	490		
1.25	PSAB 3.2	Meeting room facilities	Days	490		
1.26	8.4.2.1 (c), PSAB 3.1	Project name board (2 No.)	Days	490		
	8.4.2.2	Facilities for Contractor for duration of construction:				
1.27	8.4.2.2 (a)	a) Offices & storage sheds	Days	490		
1.28	8.4.2.2 (e)	b) Ablution & latrine facilities	Days	490		
1.29	8.4.2.2 (f)	c) Tools & equipment	Days	490		
1.30	8.4.2.2 (g)	d) Water supplies, electric power and communications	Days	490		
1.31	8.4.2.2 (h)	e) Dealing with water	Days	490		
1.32	8.4.2.2 (i)	f) Access	Days	490		
1.33	8.4.3,PS 4	Supervision for duration of construction	Days	490		
1.34	PS5	Communication and Public Relations	Days	490		
1.35	8.4.4	Company and head office overhead costs	Days	490		
1.36	8.4.5	Other time-related obligations	Days	490		
	<b>PSOH</b>	<b><u>Occupational Health and Safety</u></b>				
1.37		General safety (time related)	Days	490		
1.38		Training (time related)	Days	490		
		Allow for additional items which the tenderer requires to be priced separately				
Total Carried Forward						

**SCHEDULE 1:****PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.39		a)	Days	490		
1.40		b)	Days	490		
1.41		c)	Days	490		
1.42	PSEM	Environmental Management Plan Obligations	Days	490		
1.43		Site security for the duration of the contract	Month	18.00		
	<b>8.5</b>	<b>SUMS STATED PROVISIONALLY BY ENGINEER</b>				
1.44		Provisional sum for concrete cube strength and durability tests ordered by the Engineer	Prov Sum	1.00	150,000.00	150,000.00
1.45		Overheads, charges and profit on item 1.44	%	150,000.00		
1.46		Provisional sum for non-destructive testing of steel pipelines	Prov Sum	1.00	100,000.00	100,000.00
1.47		Overheads, charges and profit on item 1.46	%	100,000.00		
1.48	PCL	Provisional sum for Contractors responsibility in terms of the Policy for the use of Community Liaison officer (CLO), Local labour and facilitation of suitable communication mechanisms between the community and the project team.	Prov Sum	1.00	500,000.00	500,000.00
1.49		Overheads, charges and profit on item 1.48	%	500,000.00		
1.50		Provisional sum for equipment for Engineer	Prov Sum	1.00	20,000.00	20,000.00
1.51		Overheads, charges and profit on item 1.50	%	20,000.00		
1.52		Provisional sum for additional geotechnical investigations	Prov Sum	1.00	150,000.00	150,000.00
1.53		Overheads, charges and profit on item 1.52	%	150,000.00		
1.54		Provisional sum for additional surveying as directed by the Engineer	Prov Sum	1.00	50,000.00	50,000.00
1.55		Overheads, charges and profit on item 1.54	%	50,000.00		
Total Carried Forward						

**SCHEDULE 1:****PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.56	PSG 5.5.9.4	Provisional sum for repair of two PRV Chambers at Unity Avenue in Chatsworth and Locksley Drive in Sherwood, as directed by the Engineer	Prov Sum	1.00	50,000.00	50,000.00
1.57		Overheads, charges and profit on item 1.56	%	50,000.00		
1.58		Provisional sum for a weather station	Prov Sum	1.00	50,000.00	50,000.00
1.59		Overheads, charges and profit on item 1.58	%	50,000.00		
	<b>8.7</b>	<b>DAYWORKS</b>				
		<u>Labour:</u>				
1.60		Foreman	hours	30.00		
1.61		Semi-skilled	hours	50.00		
1.62		Unskilled	hours	250.00		
1.63		Surveyor with transport, instruments and labour	hours	40.00		
		<u>Constructional Plant:</u>				
1.64		CAT 930 (75kW) or similar	hours	10.00		
1.65		Other (Contractor to specify if required)	hours	20.00		
		<u>Bulldozer with ripper:</u>				
1.66		CAT D8 or similar	hours	30.00		
		<u>Motor Grader:</u>				
1.67		110 kW	hours	30.00		
1.68		Other (Contractor to specify)	hours	20.00		
		<u>Tip Truck:</u>				
1.69		10m <sup>3</sup>	hours	50.00		
1.70		6m <sup>3</sup>	hours	50.00		
1.71		Other (Contractor to specify)	hours	20.00		
		<u>Backactor:</u>				
1.72		100kW, 23 ton	hours	50.00		
1.73		30 ton	hours	10.00		
Total Carried Forward						

**SCHEDULE 1:****PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.74		TLB	hours	80.00		
1.75		Other (Contractor to specify)	hours	20.00		
		<u>Compactors:</u>				
1.76		Self propelled vibrating roller, 9 ton	hours	20.00		
1.77		Bomag 60 or similar	hours	20.00		
1.78		Plate compactor	hours	20.00		
1.79		Other (Contractor to specify)	hours	20.00		
1.80		Pneumatic Roller	hours	20.00		
		<u>Water Tankers:</u>				
1.81		Water Tanker 12000 litres	hours	150.00		
1.82		Water Tanker 9000 litres	hours	150.00		
		<u>Self propelled Crane:</u>				
1.83		20 Tonne	hours	20.00		
1.84		Generator and Breaker 5KVA	hours	50.00		
1.85		Water/Sludge Pump 50mm	hours	10.00		
		<u>Welding Equipment:</u>				
1.86		Heavy duty, self powered welding machine 400A	hours	20.00		
1.87		Welder ( Coded) with assistant	hours	20.00		
		<u>Various Other:</u>				
1.88		Compressor 400 cuft/min - with 2 breakers	hours	30.00		
1.89		Electric breaker - single phase	Day	5.00		
1.90		Angle Grinder - 230mm	Day	5.00		
1.91		Pneumatic Hammer Drill - 1500Watt	Day	5.00		
1.92		Concrete mixer - 360l capacity	Day	5.00		
1.93		7 Tonne flat bed with mounted crane and driver	hours	10.00		
1.94		1 Tonne LDV with driver	km	200.00		
1.95		Tractor 30 kW or similar	hr	10.00		
Total Carried Forward						

**SCHEDULE 1:****PRELIMINARY AND GENERAL**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
1.96		3 Disk Plow	hr	10.00		
		<u>Materials supplied by the Contractor:</u>				
1.97		Sand (building)	m³	175.00		
1.98		Sand ( river )	m³	175.00		
1.99		50kg pocket of Cement	No.	30.00		
1.100		Dump Rock 150mm	m³	40.00		
1.101		Crusher Run 28mm	m³	80.00		
1.102		G5 material	m³	80.00		
1.103		G2 material	m³	80.00		
		<u>Other to be specified by Contractor</u>				
		a)				
		b)				
		c)				
	<b>8.8</b>	<b>TEMPORARY WORKS</b>				
1.104	8.8.2	Accommodation of traffic for construction vehicles entering and leaving the construction site	Sum	1.00		
1.105	8.8.4 (c)	Excavation by hand in soft material to expose suspected but unknown existing services.	m³	50.00		
		<b>MISCELLANEOUS</b>				
1.106	PS4.11.6	As-Built Survey data and record drawings	Sum	1.00		
1.107	PS4.25	Meter Registrations	No.	4.00		
Total Carried Forward To Summary						

**SCHEDULE 1:**

**SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
1	PRELIMINARY AND GENERAL	
Total Carried Forward To Summary Of Schedules		

**SCHEDULE 2:**  
**SITE CLEARANCE**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
2	<b>SABS 1200 C</b>	<b>SITE CLEARANCE</b>				
	<b>8.2.1</b>	<b>Clear and grub:</b>				
	<b>PSC 8.2.1</b>					
2.1		a) Reservoir site	m <sup>2</sup>	3,400.00		
2.2		b) 6m wide inlet & outlet pipeline route	m <sup>2</sup>	1,600.00		
	<b>PSC 8.2.4</b>	<b>Re-clear surfaces where directed by Engineer (Provisional)</b>				
2.3		a) Reservoir Site	m <sup>2</sup>	495.00		
2.4		b) 6m wide inlet & outlet pipeline route	m <sup>2</sup>	160.00		
2.5	8.2.5	Take down existing palisade reservoir fence	m	200.00		
	8.2.8	Demolish and Remove Existing Structures/Building				
2.6		a) Demolish and remove cracked brickwork for all existing Chambers and roof access opening at Trenance 3 Reservoir site	m <sup>2</sup>	20.00		
2.7	8.2.10 PSC 8.2.10	Remove topsoil to nominal depth of 150mm and stockpile	m <sup>3</sup>	745.00		
	<b>PSC 8.2.11</b>	<b>Saw cutting of existing asphalt of thickness:</b>				
2.8		30 - 60mm	m	60.00		
2.9	PSC 8.2.13	Remove existing road asphalt surfacing and spoil at approved spoil disposal sites (25 to 45mm thickness)	m <sup>2</sup>	350.00		
	PSC 8.2.14	<b>Remove existing gravel layer works to spoil</b>				
2.10		Gravel and crushed stone layer works to roads	m <sup>3</sup>	150.00		
	<b>PSC 8.2.16</b>	<b>Remove along edges of road:</b>				
2.11		All pre-cast concrete kerbing and channelling	m	250.00		
Total Carried Forward To Summary						

**SCHEDULE 2:**  
**SECTION 2: EARTHWORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
3	<b>SABS 1200 D &amp; PSD</b>	<b>EARTHWORKS</b>				
	<b>PSD 8.3.2, PSD 3.1 &amp; PSD 5.2.5.1</b>	<b>BULK EXCAVATION</b>				
3.1		Excavate in all materials and use for embankment or backfill or dispose of at an approved spoil site to be determined by the contractor.	m <sup>3</sup>	6,260.00		
		Extra-over Item 3.1 for excavation in:				
3.2		1) Hard Material	m <sup>3</sup>	2,500.00		
3.3		2) Rock	m <sup>3</sup>	1,840.00		
3.4		Extra over Item 3.1 for backfill or for fill material against structures in 150mm layers compacted to 98% MOD AASHTO	m <sup>3</sup>	800.00		
	<b>PSD 8.3.3 (a), PSD 3.1 &amp; PSD 5.2.5.1</b>	<b>RESTRICTED EXCAVATION</b>				
3.5		Excavate in all materials for pipe block, inlet, outlet and scour chamber, water meter chambers and dispose to an approved spoil site to be determined by the contractor.	m <sup>3</sup>	256.00		
		Extra-over Item 3.5 for:				
3.6		1) Hard Material	m <sup>3</sup>	90.00		
3.7		2) Rock	m <sup>3</sup>	70.00		
3.8	8.3.10	Topsoiling (150mm) from stockpile	m <sup>2</sup>	2,650.00		
3.9	8.3.11 & PSD 8.3.11	Grassing (cynodon dactilon or similar approved)	m <sup>2</sup>	2,650.00		
	SABS 1200 DM	<b>PREPARATION OF RESERVOIR BED</b>				
		Bed preparation and compaction of material				
3.10	8.3.3 (a)	Compact the base of the excavation to 90% Mod AASHTO density.	m <sup>3</sup>	190.00		
		<b>CONSTRUCT RESERVOIR SOIL RAFT</b>				
Total Carried Forward						

**SCHEDULE 2:**  
**SECTION 2: EARTHWORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
3.11	8.3.3 (b)	Backfill two layers (each 150 mm thick) with imported G6 material. Compact each layer to 93% Mod AASHTO density.	m³	380.00		
3.12		Backfill one layer (150 mm thick) with imported G5 material. Compact layer to 95% Mod AASHTO density.	m³	190.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 3: EARTHWORKS (PIPE TRENCHES)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
4	<b>SABS 1200 DB, PSDB</b>	<b>EARTHWORKS PIPE TRENCHES</b>				
	<b>8.3.2, PSDB 8.3.2, PSDB 3.1</b>	<b>EXCAVATION FOR STEEL PIPELINES</b>				
		<u>Excavate in all materials for pipe trenches, backfill, compact to specification and dispose of surplus/unsuitable material, for pipes:</u>				
		<i>DN300 Steel Outlet pipeline for total trench depth:</i>				
4.1		Up to 2.0m	m³	40.00		
4.2		2.0m to 4.0m	m³	15.00		
		<i>DN300 Steel Suction and Discharge pipeline for total trench depth:</i>				
4.3		Up to 2.0m	m³	80.00		
4.4		2.0m to 4.0m	m³	35.00		
		<i>DN300 Steel Inlet pipeline the new 6Ml Reservoir for total trench depth:</i>				
4.5		Up to 2.0m	m³	125.00		
4.6		2.0m to 4.0m	m³	45.00		
		<i>Up to DN200 pipelines</i>				
4.7		Up to 2.0m	m³	30.00		
		<u>Extra-over Item 4.1. to 4.7 for the following: (All provisional)</u>				
4.8		1) Hard Material	m³	115.00		
4.9		2) Rock	m³	115.00		
4.10	8.3.2 (c)	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m³	50.00		
	<b>8.3.2, PSDB 8.3.2, PSDB 3.1</b>	<b>EXCAVATION FOR STORMWATER PIPELINES</b>				
		<u>Excavate in all materials for trenches, backfill, compact and dispose of surplus material, for:</u>				
		<i>110mm slotted pipe for reservoir under floor drains</i>				
Total Carried Forward						

**SCHEDULE 2:****SECTION 3: EARTHWORKS (PIPE TRENCHES)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
4.11		a) Up to 1m <i>110/150mm solid pipe from reservoir floor drain to stormwater manhole for total trench depth</i>	m <sup>3</sup>	105.00		
4.12		a) Up to 2m	m <sup>3</sup>	65.00		
4.13		b) 2m to 4m	m <sup>3</sup>	55.00		
4.14		c) 4m to 6m <i>110mm solid pipe for chamber drainage to stormwater manhole/ headwall</i>	m <sup>3</sup>	45.00		
4.15		a) Up to 2m	m <sup>3</sup>	10.00		
4.16		b) 2m to 4m <u>Excavate in all materials for 450mm concrete stormwater pipes from scour chamber pipe trenches, backfill, compact and dispose of surplus material, for total trench depth:</u>	m <sup>3</sup>	5.00		
4.17		Up to 2.0m	m <sup>3</sup>	330.00		
4.18		2.0m to 4.0m	m <sup>3</sup>	160.00		
4.19		4.0m to 6.0m	m <sup>3</sup>	80.00		
4.20		6.0m to 8.0m <u>Extra-over Item 4.11 to 4.20 above for the following: (All provisional)</u>	m <sup>3</sup>	40.00		
4.21		1) Hard Material	m <sup>3</sup>	290.00		
4.22		2) Rock	m <sup>3</sup>	320.00		
4.23	8.3.2 (c)	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m <sup>3</sup>	80.00		
	<b>8.3.3</b>	<b>EXCAVATION ANCILLARIES</b> <u>Make up deficiency in backfill material (Provisional)</u>				
4.24	8.3.3.1 (a)	a) from other necessary excavations on site	m <sup>3</sup>	100.00		
4.25	8.3.3.1 (c)	b) by importation from commercial sources	m <sup>3</sup>	605.00		
	<b>8.3.5</b>	<b>EXISTING SERVICES</b>				
Total Carried Forward						

**SCHEDULE 2:****SECTION 3: EARTHWORKS (PIPE TRENCHES)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
	8.3.5 (a)	<u>Protect, maintain, repair services that intersect a trench:</u>				
4.26		Water AC/PVC pipelines	No.	15.00		
4.27		Steel Pipelines	No.	15.00		
4.28		Concrete stormwater pipes	No.	10.00		
4.29		Electrical U/G cables	No.	15.00		
4.30		Telecommunication/ Optical Fibre Cables	No.	20.00		
	8.3.5 (b)	<u>Protect, maintain, repair services that adjoin a trench:</u>				
4.31		Water AC/PVC pipelines	m	30.00		
4.32		Steel Pipelines	m	50.00		
4.33		Concrete stormwater pipes	m	30.00		
4.34		Electrical U/G cables	m	50.00		
4.35		Telecommunication/ Optical Fibre Cables	m	50.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 4: EARTHWORKS (ROADS, SUBGRADE)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
5	<b>SABS 1200 DM, PSDM</b>	<b>EARTHWORKS (ROADS, SUBGRADE)</b>				
		<b>ROAD-BED PREPARATION</b>				
	8.3.3 (a)	Road-bed preparation and compaction of material				
5.1	PSDM 8.3.3 (a) (1)	Compact to 93 % of modified AASHTO maximum density	m <sup>3</sup>	130.00		
		<b>EARTHWORKS</b>				
	8.3.4	Cut to fill				
5.2	PSDM 8.3.4 (a) (i)	Compact to 93 % mod. AASHTO maximum density	m <sup>3</sup>	280.00		
	8.3.4	Borrow to fill				
5.3	PSDM 8.3.4 (b) (ii)	Compact to 93 % mod. AASHTO maximum density	m <sup>3</sup>	160.00		
	8.3.7, PSDM8.3.7, PSD3.1	Cut to Spoil				
5.4	8.3.7 (a)	a) Hard Material	m <sup>3</sup>	60.00		
5.5	8.3.7 (b)	b) Rock	m <sup>3</sup>	10.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
6.1	<b>SABS 1200 G PSG</b>	<b>CONCRETE (STRUCTURAL)</b>				
	<b>8.2</b>	<b>FORMWORK</b>				
	<b>8.2.2</b>	<b>Smooth Vertical Plane to:</b>				
	8.2.2	<u>Reservoir</u>				
6.2		Side of pipe block (inside face of outlet chamber)	m <sup>2</sup>	15.00		
6.3		Rear of reservoir wall bases (0.6m high)	m <sup>2</sup>	90.00		
6.4		Reservoir Walls - inside face (batter angle not exceeding 10 deg for common compartment wall)	m <sup>2</sup>	830.00		
6.5		Reservoir Walls - outside face to top of wall (batter angle not exceeding 10 deg)	m <sup>2</sup>	870.00		
6.6		Column (350mm dia x 6m high)	No.	35.00		
6.7		Column head (1200mm dia x 425mm deep truncated conical with 40mm vertical circular lip)"	No.	35.00		
6.8		Reservoir roof side including upstand beam (450mm maximum height on outer face)	m <sup>2</sup>	60.00		
6.9		Access manholes (400mm maximum height on outer face)	m <sup>2</sup>	8.00		
6.10		Access manholes (650mm maximum height on inner face)	m <sup>2</sup>	8.00		
6.11		300mm high smooth vertical face to square column pedestals	m <sup>2</sup>	70.00		
	8.2.2	<u>Chambers</u>				
6.12		Outlet and scour chamber walls	m <sup>2</sup>	35.00		
6.13		Overflow chamber walls	m <sup>2</sup>	45.00		
6.14		Inlet Chambers walls	m <sup>2</sup>	60.00		
6.15		Inlet chamber base	m <sup>2</sup>	5.00		
	<b>8.2.5</b>	<b>Smooth Vertical Narrow Widths for reservoir and chambers</b>				
6.16		300mm high for Outlet chamber base	m	35.00		
6.17		Upstand beam (200mm maximum height on inner face)	m	260.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.18		100mm high smooth vertical face to reservoir wall kicker, scour and outlet chamber, inlet chambers	m	380.00		
6.19		100mm high smooth vertical face to 350mm dia column kicker	No.	35.00		
6.20		300mm high smooth vertical face to square 1.5m x 1.5m column pedestals	No.	35.00		
6.21		200mm high smooth vertical face to inlet, outlet, scour, overflow, Telemetry Room, meter chamber roof slab.	m	100.00		
6.22		200mm high smooth side for 1200x1200 opening for chamber lids	m	15.00		
	<b>8.2.2</b>	<b>Smooth Horizontal Plane to:</b>				
	8.2.2	<u>Reservoir, chambers and telemetry room</u>				
6.23		Roof slab of reservoir (laid to fall)	m <sup>2</sup>	1,030.00		
6.24		Roof slab inlet, outlet, scour, overflow and meter chambers	m <sup>2</sup>	40.00		
6.25		Roof slab of pump and telemetry room	m <sup>2</sup>	15.00		
		<b>FORMWORK SUNDRIES</b>				
	<b>8.2.6</b>	<b>Box out holes or form voids in:</b>				
	8.2.6	Thickness up to and including for small, circular diameters up to and including 300mm.				
6.26	8.2.6 (a)	0m - 0,5m thick	No.	4.00		
	8.2.6 (c)	Thickness up to and including for large, circular diameters from 350mm to 700mm.				
6.27	8.2.6 (c)	0m - 0,5m thick	No.	5.00		
	8.2.6 (d)	Thickness up to and including for large, other shapes, area 0,1 - 0,5 m <sup>2</sup>				
6.28	8.2.6 (d)	0m - 0,5m thick	No.	4.00		
	<b>8.3</b>	<b>REINFORCEMENT</b>				
6.29	8.3.1	Mild steel bars	t	6.00		
6.30	8.3.1	High-tensile steel bars	t	180.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.31	8.3.1	Y20 galvanised dowel bars	t	8.00		
6.32		Extra over item 6.30, high tensile steel bars for supply and installation of bond breakers	No.	300.00		
	<b>8.4</b>	<b>CONCRETE</b>				
6.33	8.4.1	No-fines concrete-19mm stone (1:9 mix) to under floor drains	m³	180.00		
		<u>Grade Concrete (15 Mpa/19mm)</u>				
6.34	8.4.2	Blinding layer minimum 75mm thick for reservoir and below inlet, outlet, scour, overflow and meter chambers	m³	100.00		
	<b>8.4.3 PSG 5.5</b>	<b>Strength Concrete</b>				
	8.4.3 PSG 5.5	<u>Grade Concrete (25 Mpa/19mm)</u>				
6.35		Pipe block encasing outlet and scour pipes	m³	55.00		
6.36		Inlet, outlet, scour, overflow chamber floors	m³	20.00		
6.37		Inlet, outlet, scour, overflow chamber reinforced concrete walls	m³	30.00		
6.38		Inlet, outlet, scour, overflow chamber roof slabs	m³	20.00		
6.39		Pump house floor	m³	20.00		
6.40		Pump house walls	m³	25.00		
6.41		Pump house roof	m³	15.00		
6.42		Pump house foundation	m³	5.00		
	8.4.3 PSG 5.5	<u>Grade Concrete (30 Mpa/19mm)</u>				
6.43		Elevated tank foundation	m³	60.00		
6.44		Elevated tank stub column	m³	5.00		
6.45		Elevated tank beams	m³	35.00		
6.46		Pump Plint	m³	1.00		
	8.4.3 PSG 5.5	<u>Grade Concrete (35 Mpa/19mm) in Reservoir:</u>				
6.47		Wall bases up to kicker	m³	320.00		
6.48		Floor panels	m³	75.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.49	PSG 5.5.8 PSG 8.4.7	Walls	m³	380.00		
6.50		Column pedestals	m³	25.00		
6.51		Columns	m³	20.00		
6.52		Column heads	m³	20.00		
6.53		Roof slab	m³	270.00		
6.54		Upstand beams to roof slab and reservoir lids	m³	15.00		
		CURING AND PROTECTION				
6.55		Reservoir floor slabs and wall base	m²	1,395.00		
6.56		Reservoir Walls (inside and outside face)	m²	1,700.00		
6.57		Top surface of the reservoir roof slab	m²	1,200.00		
6.58		Soffit of the reservoir roof slab	m²	1,200.00		
6.59		Reservoir columns	m²	270.00		
6.60		Pump house floor slab	m²	55.00		
6.61		Pump house roof slab	m²	60.00		
		8.4.4 UNFORMED SURFACE FINISHES				
		8.4.4 (a) Wood-floated finish to:				
6.62		Screed to under floor drain, blinding, pipe block and chamber floors.	m²	1,750.00		
	8.4.4 (b) Steel-floated finish to:					
6.63		Reservoir floor	m²	1,200.00		
6.64		Reservoir roof	m²	1,200.00		
6.65		Top of column bases	m²	80.00		
6.66		Inlet, outlet, scour, overflow chamber roof slabs	m²	35.00		
6.67		Pump house floor slab	m²	55.00		
6.68		Pump house roof slab	m²	60.00		
	8.5 JOINTS PSG 5.5.7					
Total Carried Forward						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
		<i>The unit rate shall cover the cost of all materials and labour for the construction of each joint as shown on the drawings, including the cost of formwork, testing and making good.</i>				
6.69		Horizontal base to wall construction joint as per Detail 1 on Dwg 60570/003	m	140.00		
6.70		Vertical construction joint in reservoir floor slab 200mm high with continuous reinforcing as per Detail 2 on Dwg 60570/003	m	185.00		
6.71		Vertical construction joint in tapered wall base (600-200mm high) with continuous reinforcing	m	160.00		
6.72		Vertical construction joint (tapers 600-300mm wide) between reservoir wall panels with continuous reinforcing as per Detail 5 on Dwg 60570/003	m	130.00		
6.73		Roof slab construction joint with continuous reinforcing as per Detail 7 on Dwg 60570/003	m	60.00		
6.74		Horizontal roof slab to wall construction joint with continuous reinforcing as per Detail 4 on Dwg 60570/003	m	150.00		
6.75		Form joint between outlet/scour and reservoir wall	m	30.00		
6.76		Seal between concrete roof slabs and walls of chamber with 'Bituseal Joint Putty'	m	170.00		
6.77		Plug 75mm dia lifting holes x 150mm deep in chamber roof slabs with 'Bituseal Joint Putty'	No.	30.00		
6.78		Provide 2 coats of 'Vandex Super' 100mm wide at joints between floor and column pedestal	m	170.00		
6.79		Provide 2 coats of 'Vandex Super' 100mm wide at joints between column kicker and column	m	60.00		
6.80		Form 600mm dia x 100mm radius bell mouth in concrete floor slab for outlet pipe.	No.	1.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.81	PSG 7.3.9	Form 450mm dia x 75mm radius bell mouth in concrete floor slab for scour pipe.	No.	1.00		
		WATER TIGHTNESS TESTING				
6.82		Ponding of reservoir roof for water tightness test	Sum	1.00		
6.83		Reservoir compartment	Sum	1.00		
		MISCELLANEOUS				
6.84		Allow for the collection of chemicals from the council's store, washing and sterilising of the reservoir compartment	Sum	1.00		
6.85		Supply and cast into roof slab of scour chamber No.5 Valve Cover	No.	1.00		
6.86		Supply and Install precast concrete cover slab for PRV chambers as detailed on Dwg 052736	No.	2.00		
6.87		Supply and Install precast chamber access covers with lifting handles	No.	4.00		
6.88		Supply and install GMS cowls over 300mm dia openings	No.	3.00		
6.89		Paint exterior roof slab of Inlet, outlet, scour, overflow chamber and Pumpstation yellow road marking paint including stencilling of chamber descriptions on roof slabs	m²	150.00		
6.90		Paint chamber exterior walls of Inlet, outlet, scour, overflow chamber where above ground with 2 coats of green road marking paint	m²	110.00		
6.91		Bag wash and paint interior of PRV chambers	m²	30.00		
6.92		26mm washed stone - 100mm thick to reservoir roof	m³	120.00		
6.93		Supply and install precast concrete chamber access covers (Including replacement of concrete covers for existing chambers)	No.	10.00		
6.94		GPR Banded grating with 50 x 4.5 for drainage, aperture of 15mm, size 1400mm by 350mm to be chemically in place.	No.	5.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.95	PSG 8.9	Stainless steel grating with 50mm frame for roof drainage, aperture of 15mm, size 1400mm by 350mm to be chemically in place.	No.	6.00		
6.96		Supply and cast in DN100 cable ducts into roof slab and wall panels complete with long radius bends and draw wire.	m	75.00		
6.97		Supply and install concrete channel, Kalvis Type 04 or similar approved	m	15.00		
6.98		Underpin and support existing Reservoir 2 (2.26ML) inlet chamber foundation	Sum	1.00		
6.99		Cleaning of internal surfaces of existing chambers where instructed by the Engineer	m²	50.00		
		<b>GROUTING OR CASTING OF PIPES AND SPECIALS THROUGH/IN CHAMBER WALLS</b>				
		<u>Supply all labour, plant and materials for grouting of pipe specials through walls or slabs inclusive of pipe wall joint sealing as per Detail B on drawing 59089/19</u>				
6.100		DN300 pipeline	No.	8.00		
6.101		DN250 pipeline	No.	3.00		
6.102		DN200 pipeline	No.	3.00		
		<u>Supply all labour, plant and materials for casting of fabricated pipe specials into chamber walls and wrapping with "Denso 1250/300" Tape wrapping system 600mm long to manufacturer's specifications (puddle flange not to be wrapped):</u>				
6.103		DN300 pipeline	No.	8.00		
6.104		DN250 pipeline	No.	3.00		
6.105		DN200 pipeline	No.	3.00		
		<b>DRY STACK RETAINING WALL</b>				
	Supply all materials, plant and labour for construction of a Terraforce "L11 Standard" block retaining wall or similar approved for:					
Total Carried Forward						

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.106	PA  PA   <					

**SCHEDULE 2:****SECTION 5: CONCRETE (STRUCTURAL)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
6.115	PA	Brickwork in stretcher bond. "Roan Satin" face brick. 330mm walls with 110mm cavity including brick force every 4th course up to roof slab. 110mm cavity to be filled with 25Mpa concrete (billed elsewhere) All inclusive of cleaning brickwork and making good on completion.	m²	105.00		
6.116		Extra over Item 6.116 for construction of air vents as detailed on DWG 60570/020. Rate to include all work and fabrication of air vent	No.	4.00		
6.117		Extra over Item 6.116 for construction of brick lintel (2000mm long) as detailed on DWG 60570/015	No.	3.00		
6.118		Brickwork for PVR Chambers				
		Brickwork Cladding of PRV (230mm thick) including brick force every 4th course up to roof slab				
		(Refer to Dwg 052736 for Face brick wall cladding detail)	m²	5.00		
6.119		Extra over Item 6.118 for construction of air vents as detailed on Dwg 052736. Rate to include all work and fabrication of air vent	No.	2.00		
		Waterproofing				
6.120		375 Micron "Brickgrip DPC" or similar approved embossed black polyethylene sheeting to base of walls	m²	85.00		
6.121		Supply and Install whirlybird ventilation as per detail on DWG 60570/015	No.	2.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
7	<b>SABS 1200 L PSL</b>	<b>MEDIUM PRESSURE PIPELINES</b>				
	<b>SANS1200L</b>	<b>PIPELINES</b>				
	PSL 8.2.1	<u>Supply and install pipe, inclusive of uplifting and transportation from suppliers storage yards, checking for holidays in external coating and internal lining, in accordance with the project specification.</u>				
7.1		DN300 * 4.5mm thick * Grade C pipe	m	250.00		
7.2		DN250 * 4.5mm thick * Grade C pipe	m	100.00		
7.3		DN200 * 4.5mm thick * Grade C pipe	m	120.00		
7.4		DN150 * 4.5mm thick * Grade C pipe	m	15.00		
	PSL 8.2.2 PSL 8.2.1.3 PSL 8.2.1.1	<u>Preparation and welding of straight joints in pipeline, including NDT testing of joints and reinstatement at the joint for external coating and internal lining damage in accordance with the project specification.</u>				
7.5		DN300 * 4.5mm thick * Grade C pipe	No.	42.00		
7.6		DN250 * 4.5mm thick * Grade C pipe	No.	17.00		
7.7		DN200 * 4.5mm thick * Grade C pipe	No.	20.00		
7.8		DN150 * 4.5mm thick * Grade C pipe	No.	3.00		
	PSL 8.2.2 PSL8.2.1.3 PSL 8.2.1.2	<u>Preparation of pipe by means of cutting, welding of joint, including NDT testing of joints and reinstatement at the joint of external coating and internal lining damage in accordance with the project specification.</u> (Provisional Quantity)				
7.9		DN300 * 4.5mm thick * Grade C pipe (Provisional Quantity)	No.	42.00		
7.10		DN250 * 4.5mm thick * Grade C pipe (Provisional Quantity)	No.	17.00		
7.11		DN200 * 4.5mm thick * Grade C pipe (Provisional Quantity)	No.	20.00		
7.12		DN150 * 4.5mm thick * Grade C pipe (Provisional Quantity)	No.	3.00		
		<b>BENDS</b>				
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
		<u>Supply and Installation of Bends complete, inclusive of testing, reinstatement of external coating and internal lining, transportation, and handling:</u>				
	PSL8.2.2 & PSL 3.4.4	DN300 * 4.5mm thick * Grade C pipe (Provisional Quantity)				
7.13		0 to 15 deg	No.	8.00		
7.14		>15 to 30 deg	No.	8.00		
7.15		>30 to 45 deg	No.	10.00		
7.16		>45 to 60 deg	No.	5.00		
7.17		>60 to 75 deg	No.	2.00		
7.18		>75 to 90 deg	No.	3.00		
	PSL8.2.2 & PSL 3.4.4	DN250 * 4.5mm thick * Grade C pipe (Provisional Quantity)				
7.19		0 to 15 deg	No.	8.00		
7.20		>15 to 30 deg	No.	4.00		
7.21		>30 to 45 deg	No.	4.00		
7.22		>45 to 60 deg	No.	3.00		
7.23		>60 to 75 deg	No.	2.00		
7.24		>75 to 90 deg	No.	2.00		
	PSL 8.2.2 & PSL 3.4.4	DN200 * 4.5mm thick * Grade C pipe (Provisional Quantity)				
7.25		0 to 15 deg	No.	8.00		
7.26		>15 to 30 deg	No.	3.00		
7.27		>30 to 45 deg	No.	6.00		
7.28		>45 to 60 deg	No.	3.00		
7.29		>60 to 75 deg	No.	1.00		
7.30		>75 to 90 deg	No.	1.00		
	PSL 8.2.2 & PSL 3.4.4	DN150 * 4.5mm thick * Grade C pipe (Provisional Quantity)				
7.31		>30 to 45 deg	No.	2.00		
7.32		75 to 90 deg	No.	2.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.33	PSL 3.9	REPAIR OF COATING AND LINING  Repair, as result of damage inflicted by pipe supplier, external "Sintakote" coating complete inclusive of labour, materials, plant, supervision and QA/QC for defects:  up to 500mm <sup>2</sup> in area	Prov No.	8.00		
7.34		from 501mm <sup>2</sup> to 750mm <sup>2</sup> in area	Prov No.	8.00		
7.35		from 751mm <sup>2</sup> to 1000mm <sup>2</sup> in area	Prov No.	8.00		
7.36		from 1001mm <sup>2</sup> to 1400mm <sup>2</sup> in area	Prov No.	3.00		
7.37		Repair, as a result of damage inflicted by pipe supplier, internal coated lining, complete inclusive of labour, plant, materials, supervision and QA/QC for defects for:  up to 200mm <sup>2</sup> in area	Prov No.	8.00		
7.38		from 201mm <sup>2</sup> to 400mm <sup>2</sup> in area	Prov No.	8.00		
7.39		from 401mm <sup>2</sup> to 600mm <sup>2</sup> in area	Prov No.	8.00		
7.40		from 600mm <sup>2</sup> to 800mm <sup>2</sup> in area	Prov No.	3.00		
7.41		from 800mm <sup>2</sup> to 1000mm <sup>2</sup> in area	Prov No.	3.00		
	<b>PSL 8.2.5.1</b>	<b>SPECIAL ASSEMBLIES: SUPPLY</b>				
	PSL 3.4.4	<u>DN300 Inlet control chamber to Reservoir as per Dwg 60570/006/1</u>				
7.42		ITEM 1	No.	2.00		
7.43		ITEM 2	No.	2.00		
7.44		ITEM 3	No.	3.00		
7.45		ITEM 4	No.	6.00		
7.46		ITEM 5	No.	2.00		
7.47		ITEM 6	No.	2.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)	
Brought Forward							
7.48	PSL 3.4.4	ITEM 7	No.	2.00			
7.49		ITEM 8	No.	2.00			
7.50		ITEM 9	No.	2.00			
7.51		ITEM 10	No.	2.00			
7.52		ITEM 11	No.	1.00			
7.53		ITEM 12	No.	1.00			
7.54		ITEM 13	No.	2.00			
7.55		ITEM 14	No.	1.00			
7.56		ITEM 15	No.	1.00			
7.57		ITEM 16	No.	1.00			
7.58		ITEM 17	No.	1.00			
7.59		ITEM 18	No.	1.00			
7.60		ITEM 19	No.	1.00			
7.61		ITEM 20	No.	1.00			
7.62		ITEM 21	No.	3.00			
			<u>Outlet Structure and scour chamber details as per DWG 60570/005</u>				
7.63			ITEM 1	No.	1.00		
7.64			ITEM 2	No.	1.00		
7.65			ITEM 3	No.	1.00		
7.66			ITEM 4	No.	1.00		
7.67			ITEM 5	No.	1.00		
7.68		ITEM 6	No.	1.00			
7.69		ITEM 7	No.	1.00			
7.70		ITEM 8	No.	1.00			
7.71		ITEM 9	No.	1.00			
	PSL 3.4.4	<u>Elevated Tank Meter Outlet Chamber as per DWG 60570/025</u>					
7.72		ITEM 1	No.	2.00			
7.73		ITEM 2	No.	1.00			
Total Carried Forward							

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.74	PSL 3.4.4	ITEM 3	No.	1.00		
7.75		ITEM 4	No.	1.00		
7.76		ITEM 5	No.	2.00		
7.77		ITEM 6:	No.	1.00		
		<u>Elevated Tank Inlet Pipework as per DWG 60570/007</u>				
7.78	PSL 3.4.4	ITEM 1	No.	3.00		
7.79		ITEM 2	No.	1.00		
7.80		ITEM 3	No.	3.00		
7.81		ITEM 4	No.	1.00		
7.82		ITEM 5	No.	1.00		
	PSL 3.4.4	<u>Elevated Tank Outlet Pipework as per DWG 60570/005</u>				
7.83		ITEM 1	No.	2.00		
7.84		ITEM 3	No.	2.00		
7.85		ITEM 5	No.	1.00		
7.86		ITEM 13	No.	1.00		
	PSL 3.4.4	<u>Elevated Tank Tie in</u>				
7.87		ITEM 1	No.	1.00		
7.88		ITEM 6	No.	1.00		
7.89		ITEM 14	No.	1.00		
7.90		ITEM 15	No.	1.00		
	PSL 3.4.4	Elevated Tank Overflow and Scour Pipework as per DWG 60570/007				
7.91		ITEM 6	No.	4.00		
7.92		ITEM 7	No.	1.00		
7.93		ITEM 8	No.	6.00		
7.94		ITEM 9	No.	1.00		
7.95		ITEM 10	No.	2.00		
7.96		ITEM 12	No.	1.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.97	PSL 3.4.4	ITEM 14	No.	1.00		
7.98		ITEM 15	No.	1.00		
7.99		ITEM 16	No.	1.00		
7.100		ITEM 17	No.	1.00		
		<u>Reservoir Inlet and Outlet Meter as per DWG 60570/025</u>				
7.101		ITEM 1	No.	4.00		
7.102		ITEM 2	No.	2.00		
7.103		ITEM 3	No.	2.00		
7.104		ITEM 4	No.	2.00		
7.105		ITEM 5	No.	4.00		
7.106	PSL 3.4.4	ITEM 6	No.	2.00		
		<u>Reservoir Outlet Meter as per DWG 60570/026</u>				
7.107		ITEM 1	No.	2.00		
7.108		ITEM 2	No.	1.00		
7.109		ITEM 3	No.	1.00		
7.110		ITEM 4	No.	1.00		
7.111		ITEM 5	No.	2.00		
7.112		ITEM 6	No.	1.00		
		<u>Pump Station Suction Fittings and Pipework as per DWG 60570/015</u>				
7.113		PSL 3.4.4	ITEM S1	No.	2.00	
7.114	ITEM S2		No.	2.00		
7.115	ITEM S3		No.	2.00		
7.116	ITEM S4		No.	2.00		
7.117	ITEM S5		No.	2.00		
7.118	ITEM S6		No.	1.00		
7.119	ITEM S7		No.	1.00		
7.120	ITEM S8		No.	1.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.121	PSL 3.4.4	ITEM S9	No.	1.00		
7.122		ITEM S10	No.	1.00		
7.123		ITEM S11	No.	1.00		
		Pump Station Discharge Fittings and Pipework as per DWG 60570/015				
7.124		ITEM D1	No.	2.00		
7.125		ITEM D2	No.	2.00		
7.126		ITEM D3	No.	2.00		
7.127		ITEM D4	No.	2.00		
7.128		ITEM D5	No.	2.00		
7.129		ITEM D6	No.	2.00		
7.130		ITEM D7	No.	1.00		
7.131		ITEM D8	No.	1.00		
7.132		ITEM D9	No.	1.00		
7.133		ITEM D10	No.	1.00		
7.134		ITEM D11	No.	1.00		
7.135		ITEM D12	No.	1.00		
	<b>PSL 8.2.5.2</b>	<b>SPECIAL ASSEMBLIES: INSTALL</b>				
	PSL 3.4.4	<u>DN300 Inlet control chamber to Reservoir as per Dwg 60570/006/1</u>				
7.136		ITEM 1	No.	2.00		
7.137		ITEM 2	No.	2.00		
7.138		ITEM 3	No.	3.00		
7.139		ITEM 4	No.	6.00		
7.140		ITEM 5	No.	2.00		
7.141		ITEM 6	No.	2.00		
7.142		ITEM 7	No.	2.00		
7.143		ITEM 8	No.	2.00		
7.144		ITEM 9	No.	2.00		
7.145		ITEM 10	No.	2.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)	
Brought Forward							
7.146	PSL 3.4.4	ITEM 11	No.	1.00			
7.147		ITEM 12	No.	1.00			
7.148		ITEM 13	No.	2.00			
7.149		ITEM 14	No.	1.00			
7.150		ITEM 15	No.	1.00			
7.151		ITEM 16	No.	1.00			
7.152		ITEM 17	No.	1.00			
7.153		ITEM 18	No.	1.00			
7.154		ITEM 19	No.	1.00			
7.155		ITEM 20	No.	1.00			
7.156		ITEM 21	No.	3.00			
		<u>Outlet Structure and scour chamber details as per DWG 60570/005</u>					
7.157	PSL 3.4.4	ITEM 1	No.	1.00			
7.158		ITEM 2	No.	1.00			
7.159		ITEM 3	No.	1.00			
7.160		ITEM 4	No.	1.00			
7.161		ITEM 5	No.	1.00			
7.162		ITEM 6	No.	1.00			
7.163		ITEM 7	No.	1.00			
7.164		ITEM 8	No.	1.00			
7.165		ITEM 9	No.	1.00			
			<u>Elevated Tank Meter Chamber as per DWG 60570/025</u>				
7.166		ITEM 1	No.	2.00			
7.167		ITEM 2	No.	1.00			
7.168		ITEM 3	No.	1.00			
7.169		ITEM 4	No.	1.00			
7.170		ITEM 5	No.	2.00			
7.171		ITEM 6	No.	1.00			
Total Carried Forward							

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
	PSL 3.4.4	<u>Elevated Tank Inlet Pipework as per DWG 60570/007</u>				
7.172		ITEM 1	No.	3.00		
7.173		ITEM 2	No.	1.00		
7.174		ITEM 3	No.	3.00		
7.175		ITEM 4	No.	1.00		
7.176		ITEM 5	No.	1.00		
	PSL 3.4.4	<u>Elevated Tank Outlet Pipework as per DWG 60570/007</u>				
7.177		ITEM 1	No.	2.00		
7.178		ITEM 3	No.	2.00		
7.179		ITEM 5	No.	1.00		
7.180		ITEM 13	No.	1.00		
	PSL 3.4.4	Elevated Tank Tie In (DWG 60570/007)				
7.181		ITEM 1	No.	1.00		
7.182		ITEM 6	No.	1.00		
7.183		ITEM 14	No.	1.00		
7.184		ITEM 15	No.	1.00		
	PSL 3.4.4	Elevated Tank Overflow and Scour Pipework as per DWG 60570/007				
7.185		ITEM 6	No.	4.00		
7.186		ITEM 7	No.	1.00		
7.187		ITEM 8	No.	6.00		
7.188		ITEM 9	No.	1.00		
7.189		ITEM 10	No.	2.00		
7.190		ITEM 12	No.	1.00		
7.191		ITEM 14	No.	1.00		
7.192		ITEM 15	No.	1.00		
7.193		ITEM 16	No.	1.00		
7.194		ITEM 17	No.	1.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.195	PSL 3.4.4	Reservoir Inlet and Outlet Meters as per DWG 60570/025				
		ITEM 1	No.	4.00		
7.196		ITEM 2	No.	2.00		
7.197		ITEM 3	No.	2.00		
7.198		ITEM 4	No.	2.00		
7.199		ITEM 5	No.	4.00		
7.200		ITEM 6	No.	2.00		
	PSL 3.4.4	Reservoir Outlet Meter as per DWG 60570/026				
7.201		ITEM 1	No.	2.00		
7.202		ITEM 2	No.	1.00		
7.203		ITEM 3	No.	1.00		
7.204		ITEM 4	No.	1.00		
7.205		ITEM 5	No.	2.00		
7.206		ITEM 6	No.	1.00		
	PSL 3.4.4	Pump Station Suction Fittings and Pipework as per DWG 60570/015				
7.207		ITEM S1	No.	2.00		
7.208		ITEM S2	No.	2.00		
7.209		ITEM S3	No.	2.00		
7.210		ITEM S4	No.	2.00		
7.211		ITEM S5	No.	2.00		
7.212		ITEM S6	No.	1.00		
7.213		ITEM S7	No.	1.00		
7.214		ITEM S8	No.	1.00		
7.215		ITEM S9	No.	1.00		
7.216		ITEM S10	No.	1.00		
7.217		ITEM S11	No.	1.00		
	PSL 3.4.4	Pump Station Discharge Fittings and Pipework as per DWG 60570/015				
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)	
Brought Forward							
7.218	PSL 8.2.5	ITEM D1	No.	2.00			
7.219		ITEM D2	No.	2.00			
7.220		ITEM D3	No.	2.00			
7.221		ITEM D4	No.	2.00			
7.222		ITEM D5	No.	2.00			
7.223		ITEM D6	No.	2.00			
7.224		ITEM D7	No.	1.00			
7.225		ITEM D8	No.	1.00			
7.226		ITEM D9	No.	1.00			
7.227		ITEM D10	No.	1.00			
7.228		ITEM D11	No.	1.00			
7.229		ITEM D12	No.	1.00			
		<b>SPECIAL ASSEMBLIES: AIR VALVES</b>					
		Supply and install 50mm ø air valves complete on blank flanges as per detail 1 on Dwg 60570/006					
7.230		Item A	No.	1.00			
7.231		Item B	No.	1.00			
7.232		Item C	No.	1.00			
7.233		Item D	No.	1.00			
7.234		Supply and install 50mm ø air valves complete on pipelines as per detail on Dwg 60570/006	No.	2.00			
		<u>Supply and install 100mm ø air valves on pipelines as per air valve detail on Dwg 60570/005</u>					
7.235		Item A	No.	1.00			
7.236		Item B	No.	1.00			
7.237		Item C	No.	1.00			
7.238		Item D	No.	1.00			
7.239		Item E	No.	1.00			
Total Carried Forward							

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.240		Item F	No.	1.00		
7.241		Item G	No.	1.00		
		Supply and install 250mm ø Non-Return Valve on pipelines as per air valve detail on Dwg 60570/015				
7.242		Item D4	No.	2.00		
	<b>PSL 7.3</b>	<b>HYDRAULIC TESTING</b>				
	PSL 7.3 & PSL 8.2.2	<u>End cap, filling, testing and disinfection of pipelines within sections specified by the Engineer, for:</u>				
7.243		DN300 Steel pipe	m	250.00		
7.244		DN250 Steel pipe	m	100.00		
7.245		DN200 Steel pipe	m	120.00		
7.246		Up to and including DN150 Steel pipeline	m	15.00		
	PSL 7.3 & PSL 8.2.2	<u>Testing and Disinfecting of pipework specials in chambers</u>				
7.247		up to DN300 steel	m	50.00		
		<b>MISCELLANEOUS</b>				
		<u>Meter Kiosk</u>				
7.248	PSL 8.2.16	Supply and install concrete pipe markers ,cast into concrete surround and paint.	No.	20.00		
7.249		Return of excess materials to EWS Water stores/yard	Sum	1.00		
7.250	PSL 8.2.22	Cleaning of internal surfaces of pipeline where instructed by the Engineer	m²	200.00		
		<u>Supply all labour, plant and materials and install the following:</u>				
7.251		Up to DN250 insulating flange (inclusive of all sleeves and bolts)	No.	4.00		
7.252		DN300 insulating flange (inclusive of all sleeves and bolts)	No.	4.00		
7.253		Construct concrete surround (25Mpa) for valve covers	m³	1.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 6: MEDIUM PRESSURE PIPELINES**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
7.254	8.2.11  PSL 3.9.8.5	Supply and install No.5 valve covers and cast into concrete surround	No.	5.00		
7.255		Supply and Install concrete valve markers , cast into concrete surround and paint.	No.	5.00		
7.256		Construct using grade 15 MPa concrete thrust block inclusive of end shuttering for the following as per Dwg 60570/020	m³	5.00		
		<u>Paint all above ground pipework as per specification with an approved UV stable overcoat</u>				
7.257		Up to DN200	m	100.00		
7.258		DN200 to DN400	m	200.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 7: BEDDING (PIPES)**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
8	<b>SABS 1200 LB PSLB 8.1</b>	<b>BEDDING (PIPES)</b>				
	<b>8.2.1</b>	<b>Provision of bedding from trench excavations:</b>				
8.1		a) Selected granular material	m <sup>3</sup>	25.00		
8.2		b) Selected fill material	m <sup>3</sup>	70.00		
	<b>8.2.2</b>	<b>Supply only of bedding by importation</b>				
	<b>8.2.2.1</b>	From other necessary excavations (provisional)				
8.3		a) Selected granular material	m <sup>3</sup>	50.00		
8.4		b) Selected fill material	m <sup>3</sup>	120.00		
	<b>8.2.2.3</b>	<b>From commercial sources</b>				
8.5		a) Selected granular material	m <sup>3</sup>	80.00		
8.6		b) Selected fill material	m <sup>3</sup>	200.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 8: STORMWATER DRAINAGE**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
9	<b>SABS 1200LE</b>	<b>STORMWATER DRAINAGE</b>				
	<b>PSLE 8.2.1.1</b>	<b>Supply stormwater drainage pipes for the following:</b>				
9.1		450mm diameter rubber ring joint type Spigot and Socket Class 50D concrete pipe.	m	135.00		
9.2		110mm diameter rigid uPVC (heavy duty) slotted drainage pipes complete with couplings to under floor drains (Cordrain - Pushfit or similar approved) wrapped in Polythene Sheeting 250 micron 'Gunplas' or similar approved laid to fall in no-fine concrete measured elsewhere.	m	330.00		
9.3		110mm diameter heavy duty solid uPVC pipes laid to fall complete with couplings, bends and tees.	m	40.00		
9.4		150mm diameter uPVC slotted drainage pipes (including bends) laid to fall (Cordrain-Pushfit or similar approved) complete with couplings to heel of wall in 500 x 425 19mm stone blanket wrapped in Bidim U14 with concrete bedding cradle.	m	140.00		
9.5		200mm diameter steel pipe for elevated tank overflow, scour etc.	m	60.00		
	<b>8.2.1.2</b>	<b>Install stormwater drainage pipes for the following:</b>				
9.6		450mm diameter rubber ring joint type Spigot and Socket Class 100D concrete pipe.	m	135.00		
9.7		110mm diameter rigid uPVC (heavy duty) slotted drainage pipes complete with couplings to under floor drains (Cordrain - Pushfit or similar approved) wrapped in Polythene Sheeting 250 micron 'Gunplas' or similar approved laid to fall in no-fine concrete measured elsewhere.	m	330.00		
9.8		110mm diameter heavy duty solid uPVC pipes laid to fall complete with couplings, bends and tees.	m	40.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 8: STORMWATER DRAINAGE**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
9.9		150mm diameter uPVC slotted drainage pipes (including bends) laid to fall (Cordrain-Pushfit or similar approved) complete with couplings to heel of wall in 500 x 425 19mm stone blanket wrapped in Bidim U14 with concrete bedding cradle.	m	140.00		
		<b>Sub Soil Drain</b>				
9.10		110mm diameter rigid uPVC (heavy duty) slotted drainage pipes complete with couplings (Cordrain - Pushfit or similar approved) wrapped in 500 x 500 19mm stone blanket wrapped in Bidim U14 as shown on Dwg.	m	20.00		
	8.2.8	<b>Catchpits</b>				
9.11		Construct depressed inlet catchpit complete as per Dwg. 60570/15	No.	1.00		
	8.2.8	<b>Manholes</b>				
9.12		Supply and install 1.5m dia SW manhole complete with calcamite step-irons and 1.8m Ø x 0.9m high benched base for up to 6.0m depth.	No.	8.00		
	8.2.10	<b>Accessories</b>				
9.13		Precast lockable manhole cover complete with coping for 1.5m dia.	No.	8.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 12: ROADS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
10	<b>SABS 1200 ME/MF/MH</b>	<b>ROADS</b>				
	<b>SABS 1200 ME</b>	<b>SELECTED LAYER/SUBBASE</b>				
10.1	8.3.3	Construct 150mm thick G7 subbase course with material from commercial sources and compact to 95% MOD AASHTO	m <sup>3</sup>	130.00		
	<b>SABS 1200 MF</b>	<b>BASE/ WEARING COURSE</b>				
10.2	8.3.3	Construct 150mm thick G2 crushed stone base layer with material from commercial sources and process and compact to 102% MOD AASHTO Max. Density	m <sup>3</sup>	130.00		
		<b>BLOCK PAVING</b>				
		Provide all labour, materials, tools, equipment, and supervision required to supply, deliver, and install Armorflex 205 interlocking concrete paving blocks, including all necessary preparatory works and quality control procedures.				
		Rate to Include:				
		Supply and transport of Armorflex 205 blocks to site				
		Bedding preparation and materials				
		Laying and compaction of blocks				
		Infill material (stone or topsoil)				
		Edge restraints/anchors (if required)				
		All labour, equipment, tools, and quality control				
10.3		Armorflex 205	m <sup>2</sup>	125.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****SECTION 13: STRUCTURAL STEELWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
11	<b>SABS 1200 H</b>	<b>STRUCTURAL STEELWORK</b>				
	<b>PSET</b>	<b>400KL Steel Elevated Tank from "Hydrex" or similar approved. Refer to Dwg 60570/007 for details</b>				
	<b>PSET</b>	<b>Support Tower for Steel Elevated Tank</b>				
11.1	PSET 8.1.1	Design, manufacture and install 17.5 m high standard prefabricated tank support tower with 5.0m x 5.25m stand column centres, 750mm wide walkway around base of steel tank and safety railing to support a 9L x 7W x 4H panel pressed section steel tank. Tower complete with safety cage access ladder.	No.	1.00		
	<b>PSET</b>	<b>Sectional Steel Tank</b>				
11.2	PSET 8.1.2	Supply & install on support tower one sectional steel tank assembled from 9 x 7 x 4 No. 1.22m x 1.22m panels complete with 300mm inlet, 300mm outlet, 200mm overflow & 200mm scour pipe all flanged, lockable access hatch, safety cage access ladder to access hatch and safety railing around top of tank.	No.	1.00		
11.3		Extra over for pipe supports complete with strap, suitable for up to DN300 at not more than 3m intervals as per Dwg 60570/020	No.	10.00		
		<b>OVERHEAD GANTRY / CRAWL BEAM</b>				
		Refer to Dwg 60570/015 for dimensions and details				
11.4		Design of 1 ton electrically controlled overhead single girder gantry / crawl beam complete with crane runway beam, crane crawl beam, crane end stops, beam end plates, support connections, holding down bolts, crane mechanism, hoists, hooks, handsets etc including all electrical components as per eThekweni Municipality specifications and preparation of shop drawings for Engineer's approval	Sum	1.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 13: STRUCTURAL STEELWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
11.5		Preparation and supply of shop drawings for 1 ton electrically controlled overhead single girder crane complete	Sum	1.00		
11.6		Manufacture, supply and delivery to site of overhead single girder crane including all labour, bolts, nuts, equipment, corrosion protection etc. Including all brackets, rails, fasteners etc	Sum	1.00		
11.7		Corrosion prevention and Painting of all components of gantry crane in accordance with specifications and eThekweni Municipality's colour specifications	Sum	1.00		
11.8		Install and commission with relevant safety certificate for overhead single girder crane including crane rail, crane beam, crane end stops, support connections, holding down bolts, anchors, hoists, hooks, handsets, load test equipment, etc inclusive of all electrical components	Sum	1.00		
11.9		Load Test of 1 ton electrically controlled overhead single girder crane. Load tests for crane to be as laid down in SANS 4310:2002 and as required by local and national regulations	Sum	1.00		
11.10		<b>Fencing</b> Supply and reinstate concrete palisade fence From "Concretex" or similar approved	m	200.00		
11.11		Supply and install double leaf entrance gate complete as per Dwg 68184 (rate to include for supply, fabricate and installation)	No.	1.00		
	8.3.8	<b>Miscellaneous</b> <u>Supply all and install GRP ladders including stringers, rungs and safety cage where required 'Fibretek' or similar approved.</u>				
11.12		Reservoir internal access hatch ladder 7000mm complete with safety cage long as per Dwg 60570/022	No.	2.00		
Total Carried Forward						

**SCHEDULE 2:****SECTION 13: STRUCTURAL STEELWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
11.13	8.3.7(b)	External access ladder to roof 4500mm long as per Dwg 45005	No.	3.00		
11.14		Inlet Chamber access ladder complete with safety cage 2300mm long as per Dwg 60570/022	No.	1.00		
11.15		Outlet & Scour Chamber access ladder complete with safety cage, 3500mm long as per Dwg 60570/022	No.	2.00		
		<u>Handrail assembly complete with stanchions, bends and ends (GRP) ("FibreTek" top mounted) or similar approved to new and existing reservoir roof parapet beam and chamber access hatches.</u>				
11.16		Horizontal	m	200.00		
11.17		90deg short radius bend	No.	20.00		
11.18		Other angles other than 90deg	No.	25.00		
11.19		Shaped ends	No.	20.00		
11.20		Supply and install engraved brass plaque as per Bench Mark Detail on Dwg 60570/004	No.	1.00		
		<u>Manufacture, supply all labour, plant and materials and install the following:</u>				
11.21		Galvanised mild steel lockable 1070x1070 access manhole lid for chambers as per detail F on Dwg 60570/020	No.	2.00		
11.22		Galvanised mild steel lockable 1200x1200 access manhole lid for chambers as per detail F on Dwg 60570/020	No.	5.00		
11.23		Reinstallation of the roof access opening steel cover and frame to match the existing	No.	3.00		
11.24		Galvanised air vent 2500mm for Inlet chamber long as per Air Vent Detail on Dwg 60570/020	No.	2.00		
11.25		Galvanised air vent 4000mm for Outlet structure long as per Air Vent Detail on Dwg 60570/020	No.	3.00		
11.26	Pipe supports suitable up to DN300 complete as per Dwg 60570/020	No.	4.00			
Total Carried Forward						

**SCHEDULE 2:****SECTION 13: STRUCTURAL STEELWORK**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
11.27		Fabricate, supply and install Hot Dipped Galvanised DN300 Inlet pipe strap complete as per detail on Dwg 60570/020	No.	3.00		
11.28		Securex C250 medium duty ductile iron cover and frame fixed over 560mm diameter hole in chamber roof slab	No.	2.00		
11.29		Supply, fabricate and install meter protection sleeve as per detail	No.	2.00		
11.30		1800mm x 900mm 'MUTUAL SECURITY DOOR TYPE ZINGA 1' as per Dwg 60570/015 for telemetry room.	No.	2.00		
11.31		Design, Supply and Install Lightning Protection	Sum	1.00		
Total Carried Forward To Summary						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
12		<b>ELECTRICAL AND INSTRUMENTATION</b>  Design, manufacture, work test, supply, deliver to site, off-load , store if necessary and install the following electrical equipment , MCC, PLC etc as specified and indicated on the drawings  NOTE : PLC SYSTEM INTEGRATOR MUST BE A REGISTERED AND CERTIFIED SYSTEM INTEGRATOR FOR THE PLC TO BE USED				
12.1	PS ECI 2.4.1 ; SANS10142 ; EWS Standard Specifications GS1 - DBs & MCCs	400 Volt MCC for Trenance 3 Pumpstation as specified (excluding the VSDs)	Sum	1.0		
12.2	PS ECI 2.4.1 ; SANS10142 ; EWS Standard Specifications GS1 - DBs & MCCs	400Volt 37 kW as specified and to EWS standard with high IP rating for dust and moisture ingress	No.	2.0		
12.3	PS ECI 2.4.1 ; IEEE519	Allow an amount to conduct the power quality and harmonic study for all the VSD installations	Sum	1.0		
12.4	PS ECI 2.4.1 ; IEEE519	Allow an amount to supply and install harmonic filters and chokes with all cabling, ancillary equipment etc complete as deemed necessary from the harmonic study	Sum	1.0		
12.5	PS ECI 2.4.1; EWS Standard Specification for PLC_Rev06	Batteries , UPS , battery charger etc installed in MCC cubicle as specified ( include for anti-theft limit switches on the UPS box, battery box and PLC box)	Sum	1.0		
12.6	PS ECI 4.1.4; EWS Standard Specification for PLC _ Rev06	PLC hardware and HMI as specified under the PLC Specification_Rev 06 ( specification enclosed with the tender) [ incl ethernet/serial links]	Sum	1.0		
12.7	EWS Standard Specification for PLC_Rev06	Prepare and submit the hard and soft copies for approval of the FDS specification and how the PLC software will be implemented ( Provisional item)	Sum	1.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.8	EWS Standard Specification for PLC_Rev06	Allow for programming of the PLC using IEC-61131-3 coding standards ( Ladder Logic) as per the PLC Specification_ Rev 06 (Provisional item)	Sum	1.0		
12.9	EWS Standard Specification for PLC_Rev06	Allow for Thin Slice testing, FATs, SATs and Commissioning Stages- As per Quality Control specification. (To be conducted jointly by the EWS Engineers and staff and their representatives)	Sum	1.0		
12.10	EWS Standard Specification for PLC_Rev06	Allow for PLC and HMI Quality Control as per PLC Specification_ Rev 06	Sum	1.0		
12.11	EWS Standard Specification for PLC_Rev06	Allow a sum for the PLC licenses , including all profit and attendance	Sum	1.0		
12.12	EWS Standard Specification for PLC_Rev06	Allow a provisional sum of R 75 000,00 for PLC OEM Training in terms of PLC programming to EWS staff members at the programmer's offices and which is clearly defined in terms of structure and method and on site training	Prov Sum	1.0	75,000.00	75,000.00
12.13		Contractor's mark up on item 12.12	%	75,000.0		
12.14		Allow a sum for attendance to technical bi-weekly meetings with the EWS staff , Engineer and other contractors for duration of the contract	Sum	1.0		
12.15		Allow a sum for attendance on site and assist with the commissioning of the pumps.	Sum	1.0		
12.16	SANS10142 ; EWS Standard Specifications GS1 - DBs and MCCs	Allow for initial tests ,works test , FAT and final testing and commissioning of all electrical plant, MCC, and other electrical and instrumentation equipment as specified	Sum	1.0		
12.17	SANS10142 ; EWS Standard Specifications GS1 - DBs and MCCs	Test the entire installation including for issue of the compliance certificates in accordance with SANS 10142	Sum	1.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.18	EWS Standard Specifications GS1 - DBs and MCCs	Allow for provision of the O & M manuals including MCC as- built drawings and wiring diagrams, specifications and parts list of electrical equipment including As Built loop /block diagrams , post and final FDS and cable schedules etc complete	Sum	1.0		
	SANS10142	Supply all materials, deliver to site, unload, store, install, commission and test the domestic electrical installation and ancillary equipment in accordance with the specifications, schedules and drawings as ff:				
12.19	SANS10142; EWS Standard Specifications GS1 - DBs and MCCs	a) Emergency stop locks with stainless steel stand-off brackets fixed adjacent each pump	No.	2.0		
12.20	SANS10142; EWS Standard Specifications GS1 - DBs and MCCs	b) Low level floats with s/steel chain and weights in the existing 3 x clear water reservoirs for the pump low level cut out ( wired in series )	No.	3.0		
		Supply and install the following instruments :				
12.21	PS ECI 2.20 ; EWS Standard Specifications for Telemetry and Instruments _ Rev01	a) Electronic no-flow switches as specified and to EWS standard including sockets with stop cocks on pipe delivery mains	No.	2.0		
12.22	PS ECI 2.20 ; EWS Standard Specifications for Telemetry and Instruments _ Rev01	b) 0-40KPA range pressure transmitter installed on delivery side of pumps as specified and to EWS standard. To be supplied complete with matching controller installed in MCC and to communicate and interface to PLC	No.	1.0		
12.23	PS ECI 2.20 ; EWS Standard Specifications for Telemetry and Instruments _ Rev01	c) 0-20KPA range pressure transmitter installed on suction manifold of pumps as specified and to EWS standard. To be supplied complete with matching controller installed in MCC and to communicate and interface to PLC	No.	2.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.24	SANS10142	Supply and install suitable heavy duty 3CR12 cable junction box with links for termination of motor power cables and pump & motor sensor cables to be installed at each pump/motor for maintenance purposes (separate boxes for power and instrument cables)	No.	2.0		
12.25	SANS10142	Supply and install IP65 weatherproof CCG boxes for termination of instruments	No.	16.0		
	PS ECI 2.15 ; SANS10142	Supply, deliver to site, off-load and store if necessary, the following PVC ECC SWA cables(660/1000V grade) to SABS 1507:1990 as amended and specified.				
12.26		a) 95mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC (Power Cable from Mini-Sub)	m	60.0		
12.27		b) 70mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC (Power Cable from Meter to MCC)	m	50.0		
12.28		c) 25mm <sup>2</sup> x 3 & 4C PVC/ECC/SWA/PVC	m	30.0		
12.29		d) 16mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	25.0		
12.30		e) 1.5mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	200.0		
12.31		f) 1.5mm <sup>2</sup> x 2C PVC/ECC/SWA/PVC	m	140.0		
12.32		g) Dekron instrument cable	m	200.0		
12.33		h) 1.0mm <sup>2</sup> Twisted Pair 4 - 6 Pair individually screened overall screened SWA CAT 6 instrument cable	m	240.0		
12.34		i) 16mm <sup>2</sup> x BCEW ( to VSDs & motors )	m	50.0		
12.35		j) 10mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	15.0		
	PS ECI 2.15 ; SANS10142	Install in trenches, duct, sleeves, cable tray and in manholes the following cables supplied under Item 14.6				
12.36		a) 95mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	60.0		
12.37		b) 70mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	50.0		
12.38		c) 25mm <sup>2</sup> x 3 & 4C PVC/ECC/SWA/PVC	m	30.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.39	PS ECI 2.15 ; SANS10142	d) 16mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	25.0		
12.40		e) 1.5mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	200.0		
12.41		f) 1.5mm <sup>2</sup> x 2C PVC/ECC/SWA/PVC	m	140.0		
12.42		g) Dekron instrument cable	m	200.0		
12.43		h) 1.0mm <sup>2</sup> Twisted Pair 4 - 6 Pair individually screened overall screened SWA CAT 6 instrument cable	m	240.0		
12.44		i) 16mm <sup>2</sup> x BCEW	m	50.0		
12.45		j) 10mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	m	15.0		
		Make off ends, connect up, including glands, lugs. etc. test and commission the following cables supplied under Item 14.6 (outdoor glands shall be CCG weatherproof corrogland type)				
12.46		a) 95mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	No.	4.0		
12.47		b) 70mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	No.	8.0		
12.48	PS ECI 2.15 ; SANS10142	c) 25mm <sup>2</sup> x 3 & 4C PVC/ECC/SWA/PVC	No.	8.0		
12.49		d) 16mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	No.	8.0		
12.50		e) 1.5mm <sup>2</sup> x 4C PVC/ECC/SWA/PVC	No.	30.0		
12.51		f) 1.5mm <sup>2</sup> x 2C PVC/ECC/SWA/PVC	No.	30.0		
12.52		g) Dekron instrument cable	No.	20.0		
12.53		h) 1.0mm <sup>2</sup> Twisted Pair 4 - 6 Pair individually screened overall screened SWA CAT 6 instrument cable	No.	20.0		
12.54		i) 16mm <sup>2</sup> x BCEW	No.	8.0		
12.55		k) 70mm <sup>2</sup> x BCEW	No.	8.0		
12.56		l) 25mm <sup>2</sup> x 3C trailing cable to motor terminals	m	15.0		
12.57		o) Excavate and backfill cable trenches below ground level in all classes of pickable material and backfill ( for rate only - future use)	m <sup>3</sup>	150.0		
12.58	PS ECI 2.15 ; SANS10142	p) Supply and lay Allen yellow plastic cable marking tape 150mm above cable during backfilling	m	150.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.59	SANS1200	q) Supply and install 20Mpa concrete over the cables and sleeves (150mm thick x 300mm wide) over 140m . (Rate only)	m <sup>2</sup>	3.0		
12.60	SANS10142	r) Supply and install 3 phase meter box to eThekweni Electricity Dept. standards for pump station and reservoir sites	m <sup>2</sup>	1.0		
12.61	PS ECI 2.15 ; SANS10142	Supply and install LG or similar concrete cable markers to SABS Specifications	m <sup>2</sup>	12.0		
	SANS10142	Supply and install galvanised or similar approved cable tray including all sets, bends, etc. fixed to structures, walls, etc. including fixings as ff:				
12.62		a)300mm wide	m	20.0		
12.63		b)100mm wide	m	40.0		
	SANS10142	Supply and install the following uPVC cable sleeves and manhole including bends, etc. :-				
12.64		a) 110-160mm <sup>2</sup>	m	15.0		
12.65		b) 50mm <sup>2</sup>	m	10.0		
12.66		Allow an amount to seal all cable sleeves in MCC and Telemetry Room on successful commissioning and completion of the works ( sum )	Sum	1.0		
		Note : All lighting, sockets, outlets, isolators, etc. to include for conduit, wiring, switches, covers, etc. for a complete working installation				
	PS ECI 2.12 to PS ECI 2.14; SANS10142	(Supply and install the following including PVC conduit, wiring etc complete)				
12.67		a) Surface fluorescent light outlets with junction boxes including conduit and wiring etc complete	No.	12.0		
12.68		b) Bulkhead and floodlight light outlets including conduit and wiring etc complete	No.	6.0		
12.69		c) Photo cell including conduiting and wiring etc complete	No.	1.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.70	PS ECI 2.21 ; OHS Act	d) Double 16A switched socket outlet surface weatherproof and UPS red outlet including conduit and wiring etc complete	No.	6.0		
12.71		e) Surface 1 and 2 way light switch including conduit and wiring etc complete	No.	4.0		
12.72		f) 1,5m light with carbonate diffuser type Corrosion Proof C2-2 x 26W LED light fitting with 26W LED lamps (1.5m long)	No.	12.0		
12.73		g) Bulkhead lights type B20-2PL9SS screws light fitting with vandal proof glass, wire screen and screws	No.	6.0		
12.74		h) 100W LED floodlight LED lamp and aluminium body	No.	4.0		
12.75		i) 32Amp 3 phase 5 pin welding socket outlet complete	No.	1.0		
12.76		Supply and install the 400V DB for the pump station telemetry room as specified	Sum	1.0		
		Allow for all statutory safety equipment and warning notice etc.				
12.77		a) 9kg DCP fire extinguisher	No.	2.0		
12.78		b) Danger sign Electricity, No Unauthorised Entry	Sum	1.0		
12.79		c) Machine starts automatically warning notice	Sum	1.0		
12.80		d) Labels and name plates for pumps as specified ( number plate type )	No.	2.0		
12.81		High pressure danger and warning signage	No.	1.0		
12.82	PS ECI 2.22	Supply and install smoke detector and siren to Metro Standards including power supply and cabling to MCC and wiring to connect to PLC (To pumpstation and telemetry room)	No.	3.0		
12.83	PS ECI 2.22	Supply and install PIR intruder alarm sensors Metro Standards including cabling to MCC and wiring and connect to PLC (To pumpstation and telemetry room)	No.	3.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.84	PS ECI 2.18	Make application for power supply and liaise with and attendance for the power connection by eThekwin Electricity for the pump station and reservoir ( 2 sites )	Sum	1.0		
12.85		Allow a provisional sum for the Engineer to carry out the MCC FAT and other tests.	Prov Sum	1.0	50,000.00	50,000.00
12.86		Allow for profit and overheads on item 12.85	%	50,000.00		
12.87		Allow a sum for attendance on site and assist with the final testing and commissioning of the pumps, electrics and MCC	Sum	1.0		
12.88		Allow a provisional sum for any unforeseen work on site to be used at the entire discretion of the Engineer or Client.	Prov Sum	1.0	95,000.00	95,000.00
12.89		Allow for profit and overheads on item 12.88	%	95,000.0		
12.90	PS ECI 2.15	TELEMETRY EQUIPMENT ( by specialist )				
12.91	PS ECI 2.15	Supply and install of instrument cable for transducers (1.0 mm² SWA twisted 2 pair shielded and overall shielded) in provided cable routes/trenches by others	m	180.0		
12.92	SANS10142	Supply and install of instrument cable for flow meters (1.0 mm² SWA twisted 16 pair shielded and overall shielded) in provided cable trays and routes/trenches by others	m	180.0		
12.93	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Supply and install bosal pipe at the reservoir and pump station sites	m	80.0		
		Supply and install new telemetry equipment and telemetry panel to include RTU , digital radios etc ( Trenance 3 Pump Station ) as per specifications.	Sum	1.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.94	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Supply and install the 100A/hr batteries for telemetry panels	No.	2.0		
12.95	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Supply and installation of new Webb radio antenna, with cables with associated mountings and accessories.	Sum	1.0		
12.96	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Configuration, testing and Commissioning of Telemetry, Instrumentation (Level and Flow), Pump Control and SCADA systems .	Sum	1.0		
12.97	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Supply and wire optical isolation between serial devices (Moxa TCC120I )	Sum	1.0		
12.98	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Supply and wire serial surge protection and DC supply surge protection devices	set	4.0		
12.99	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Allow an amount to integrate the new 4 x mag flow meter to the telemetry panel and to the SCADA system including all hardware , software , relays , cabling between the flow meter and telemetry panel etc complete ( allow 40m of cabling for each meter )	Sum	1.0		
12.100	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Allow an amount to integrate the new MCC and pump status to the telemetry panel and to the SCADA system including all hardware , software , cabling between the MCC and telemetry panel etc complete	Sum	1.0		
12.101	PS ECI 2.20 ; EWS Standard Specification for Instruments	Supply and install the ultrasonic level sensors as specified ( 10m depth ) complete with stainless steel brackets etc complete at the reservoirs and elevated tank	Sum	4.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.102	PS ECI 2.16 ; Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Allow an amount to integrate the new level sensors ( 4 No ) for existing 2 reservoirs , 1 new reservoir and 1 new elevated tank to the telemetry system including all hardware , cabling etc complete	Sum	1.0		
12.103	Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Allow for existing SCADA upgrade at EWS Control Room , software upgrade, re-programming , configuration and integration	Sum	1.0		
12.104	Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Facilitate training on SCADA, Instrumentation and Telemetry Systems	Sum	1.0		
12.105		Provide project management and attend meetings , testing and commissioning etc	Sum	1.0		
12.106	Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Documentation pack with all drawings, wiring diagrams , block diagrams , loop diagrams, PLC I/O lists, hand-over documentation etc complete for the telemetry system	No.	1.0		
12.107		Allow a sum for OEM training by KSB or their agents for the pumps and pumping plant for all the pumps provided for the Trenance 3 pump station	Sum	1.0		
12.108	SANS10142	Supply and install Luft or similar approved extract fan wall mounted including making opening in brickwork. Fan type Luft LPA500/43F 1350rpm 0,37kW 1,3A with WC500 cowl and insect screen ( installed in pump station )	No.	3.0		
12.109	PS ECI 2.11	Allow a provisional for the refurbishment of the existing 100KVA stand-by diesel generator	Prov Sum	1.0	300,000.00	300,000.00
12.110		Allow for profit and attendance on provisional sum item 12.109	%	300,000.0		
12.111	SANS10142	Make safe, disconnect and remove the existing MCC supplying the existing 2 x 7,5kW submersible pumps and deliver to EWS stores in Springfield	Sum	1.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.112	SANS10142	Disconnect and remove all the existing instruments , level sensors, flow meters etc and deliver to EWS stores in Springfield  Any other item the contractor considers has been omitted and requires separate prices  a) b)  FLOW METERS	Sum	1.0		
12.113	PS ECI 2.5; SANS10142	Supply and install the weatherproof 230Volt DB at the Trenance 3 Reservoir and Pump Station site to power the ultrasonic flow meter ( 24V DC supply ) and to power the telemetry panel	Sum	1.0		
12.114	Standard EWS Specification for Telemetry & Instrumentation _ Rev01	Supply and Install ultrasonic flow meters as shown on the drawings transmitter and install, connect up, test and commission the flow meter supplied under the civil contract ( include to configure the meter to communicate and interface with the telemetry and SCADA system , to include meter supplier to be in attendance on site )	Sum	1.0		
	PS ECI 2.15	FLOW METER CABLING  Supply and install in trenches 300/500 V XLPE insulated galvanised steel wire armoured ( SWA) instrumentation cabling. Conductors plain annealed class 4 bunched copper with numbering , twisted pairs with individual and overall tinned copper drain wire including individual & overall aluminium Mylar screen				
12.115		a) Supply 1.0mm² 16-core	m	150.0		
12.116		b) Install 1.0mm² 16 -core	m	150.0		
12.117		c) Terminate 1.0mm² 16 -core	No.	8.0		
		COMMUNICATION CABLE				
12.118		a) Supply and connect up the comms cable between the transmitter to the flow meter sensor (by instrument specialist)	m	220.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.119	Standard EWS Specification for Telemetry & Instrumentation _ Rev01	b) Terminate above cables at both ends	No.	8.0		
12.120		SURGE PROTECTION  Supply and install DIN rail mounted pre-fused surge arresters and fuses. Arresters to be combined lightning current and surge arrester for protection of power supply and information / signal systems and cabling as ff:	No.	1.0		
12.121		ENCLOSURES & TRUNKING  Supply and install the following :				
12.122	PS ECI 2.25; SANS10313; SANS10199 ; IEC62305	a) 200X2000x75mm IP65 polycarbonate box surface mounted in equipment kiosk with clear lid and 1 x rows of DIN rail and 20 terminal DIN mount block	No.	4.0		
12.123		b) 40x25mm PVC trunking with cover fixed inside kiosk to hold internal wiring including all necessary fixings and accessories	m	4.0		
12.124		EARTHING AND BONDING  Supply and install the following :				
12.125		a) 200x50x6mm thick copper earth bar pre-drilled with 3 holes for 10mm brass bolts fixed to wall of pump station with 50mm insulators	No.	4.0		
12.126		b) 1.8m long 16mm diameter earth rod connected to MCC building earth mat	No.	4.0		
12.127		c) 35mm <sup>2</sup> PVC insulated earth wire connected to MCC building earth mat	m	40.0		
		d) 35mm <sup>2</sup> PVC insulated earth wire terminations	No.	30.0		
		e) PVC earth inspection pit/well with cover 300x300	No.	4.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.128	PS ECI 2.25; SANS10313; SANS10199 ; IEC62305	f) Test the earth resistance between the earth bar and ground /earth mat and submit results to Engineer together with the compliance certificates( include in manuals)	Sum	1.0		
12.129		Provide as-built drawings and wiring diagrams of the electronic installation for the 4 off meters	Sum	1.0		
12.130		60 Amp DP isolator / fuses DIN mounted in weatherproof enclosure	No.	4.0		
12.131		Provide the certificate of compliance to SANS101042 for the electrical and electronic systems for the installation of the ultrasonic or mag flow meters and level transmitters	Sum	1.0		
12.132		Allow to supply and install the device plate/s for the above equipment	No.	4.0		
12.133		Allow a sum for configuration and testing and commissioning of the flow meter complete	No.	4.0		
		Any other item the tenderer considers has been omitted and requires separate prices for the lightning protection & earthing installation etc				
		a)				
		b)				
		LIGHTNING PROTECTION AND EARTHING - TO TRENANCE 3 PUMP STATION, ELEVATED TANK RESERVOIRS				
		Supply, install, test and commission the ffg as specified:				
12.134		a) Carry out the earth resistivity survey of all the sites at the reservoir, Elevated Tank, MCC room and Telemetry room ( for Trenchance 3 Sites )	Sum	1.0		
12.135		b) Supply and install the 70mm <sup>2</sup> bare copper trench ring main	m	340.0		
12.136		c) Trenching and backfilling for earth mat	m	340.0		
12.137		d) 70mm <sup>2</sup> PVC insulated earth wires	m	160.0		
Total Carried Forward						

**SCHEDULE 2:****ELECTRICAL AND INSTRUMENTATION**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
Brought Forward						
12.138	PS ECI 2.25; SANS10313; SANS10199 ; IEC62305	e) 16mm diameter X 1.8m long earth electrodes and 300x300 cast iron wells	No.	30.0		
12.139		f) Earth bushes brass type on concrete plinths or walls connected to reinforcing(include for breaking concrete to expose steel and making good)	No.	30.0		
12.140		g) 70mm <sup>2</sup> PVC connections from earth bushes to reservoir or roof reinforcing	m	80.0		
12.141		h) 25mm dia PVC conduit for earth wires ( some cast into walls and roof slabs)	m	80.0		
12.142		i) 300x6mm thick earth bar for adjacent to MCC and connection to MCC	No.	1.0		
12.143		j) 10mm dia solid aluminium earth finials/conductor on MCC/Telemetry room roof and on reservoir roof connected to roof reinforcing steel	m	240.0		
12.144		k) 70mm <sup>2</sup> terminations	No.	60.0		
12.145		Test and commission the lightning protection and earthing installation for the entire site ( for all structures ) and issue of the earth test certificates, as-built layouts and compliance certificates	Sum	1.0		
		Any other item the tenderer considers has been omitted and requires separate prices for the lightning protection and other installations				
		a)				
		b)				
Total Carried Forward To Summary						

**SCHEDULE 2:****MECHANICAL EQUIPMENT AND ANCILLARY WORKS**

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (RAND)
13	PS WPE	MECHANICAL EQUIPMENT AND ANCILLARY WORKS				
		PUMPS AND ANCILLARY WORKS				
13.1		Supply, deliver and install new pumps , baseplates , couplings , coupling guards, mounting / support frames, belts etc including all sensors as specified complete (1 duty, and 1 stand-by) - duty 374m³/hr @ 19.7m head as specified.	No.	2.0		
13.2		Supply, install and connect up the following ancillary equipment :	No.	2.0		
13.3		b) ½" BSP sockets with stop-cocks welded on steel pipework	No.	2.0		
13.4		c) Electronic pressure transmitters and sensors 100-1000kPA pressure rating	No.	4.0		
13.5		SAT - Test and commission of the new pump sets on site	No.	2.0		
		MOTORS AND ANCILLARY WORKS				
13.6		Supply and install new WEG or similar approved 37kW, 400V motors as specified, including all new galvanised bolts, nuts, washers and relevant ancillary components.	No.	2.00		
13.7		Testing and commissioning as per specifications	No.	2.00		
13.8	PS WPE 11	Allow for laser alignment the new pumps supplied above ( provide certificates )	No.	2.0		
13.9	PS WPE 12	Allow for the FAT for the above pumps	Sum	1.0		
13.10	PS WPE 12	Allow for the Engineer and Client to attend the FAT for the above pumps ( to include for flights, travel, car hire , accommodation, meals , entertainment etc ) . Allowance to be made for 3 persons	Sum	1.0		
Total Carried Forward To Summary						

**SCHEDULE 2:****SUMMARY OF SECTIONS**

SECTION	DESCRIPTION	AMOUNT (RAND)
2	SITE CLEARANCE	
3	EARTHWORKS	
4	EARTHWORKS (PIPE TRENCHES)	
5	EARTHWORKS (ROADS, SUBGRADE)	
6.1	CONCRETE (STRUCTURAL)	
7	MEDIUM PRESSURE PIPELINES	
8	BEDDING (PIPES)	
9	STORMWATER DRAINAGE	
10	ROADS	
11	STRUCTURAL STEELWORK	
12	ELECTRICAL AND INSTRUMENTATION	
13	MECHANICAL EQUIPMENT AND ANCILLARY WORKS	
Total Carried Forward To Summary Of Schedules		



**PART C3: SCOPE OF WORK**

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## **C3.1: PROJECT DESCRIPTION AND SCOPE OF CONTRACT**

### **C3.1.1 DESCRIPTION OF THE WORKS**

eThekwini Municipality's Water and Sanitation (EWS) Unit has identified within its bulk reservoir supply network, the need to increase storage at the Trenance 3 Reservoir site which is supplied from the Trenance 1 Reservoir.

The Works under this Contract consists of the construction of a single cell 6Mℓ reinforced concrete reservoir, 400Kℓ elevated tank and the construction of a pumpstation.

#### **C3.1.1.1 EMPLOYERS OBJECTIVES**

This Contract has been prepared to assist EWS in achieving the objectives of its service delivery charter by improving and upgrading key infrastructure components and providing a service that is efficient, effective, affordable and sustainable, for the specific area.

The Trenance 3 reservoir presently supplies the existing Trenance high-level and low-level zone. The increase in the Trenance 3 reservoir demand together with the increase in the demand of the downstream areas has resulted in water supply constraints due to insufficient storage onsite.

The objective is to increase storage capacity at the existing Trenance 3 reservoir site in order to meet the increased demand in the supply area.

### **C3.1.2 OVERVIEW AND EXTENT OF THE WORKS**

#### **C3.1.2.1 GENERAL OVERVIEW**

This Contract is for the construction of a 6 Megalitre (Mℓ) reinforced concrete potable water reservoir, 400 Kilolitre (Kℓ) elevated steel tank and pumpstation, inlet and outlet works, overflow and scour works and bulk earthworks. The installation of all control valves, interconnecting pipe work, metering, telemetry, buildings & chambers, fencing reinstatement and associated ancillary works which includes the construction of the access road.

#### **C3.1.2.2 MAIN COMPONENTS OF THE WORKS**

The scope of works to be carried under this Contract is shown on the drawings and described in the specifications and may be described as comprising but not limited to the following:

##### **Civil and Structural**

- Construction of a watertight reinforced concrete reservoir consisting of a single cell with internal dimensions of 38 m x 26 m x 6.6 m high, including the construction of wall bases, column bases and columns, semi-propped cantilever walls, inlet and outlet works, and a reinforced concrete roof.
- Under-drainage system beneath the reservoir floor;
- Construction of a new pump station building including the telemetry room;
- Reinforced concrete chambers;
- Brick cladding of the new 6Mℓ reservoir;
- Construction of a 400Kℓ elevated steel tank with an approximate stand height of 20 m;
- Bulk Earthworks for reservoir site and access road where applicable, pipeline and cable trenching;
- Laying, bedding, jointing, testing and disinfecting of steel pipes, fittings and valves of diameter up to and including DN 400;
- Planning for ordering and ordering of all materials especially long lead items;

- Proving and locating existing reservoir inlet and outlet pipes at the reservoir site;
- Proving and locating existing elevated tower inlet and outlet pipes at the reservoir site;
- Installation of all control valves and isolating valves on the inlets, outlet and scour pipelines;
- Barricading all earthworks and trenches;
- Accommodation of traffic where works is required in existing roads;
- Reinforced concrete chambers;
- Repair of chambers at Sherwood and Chatsworth;
- Protection of all services affected by the construction of the reservoir, elevated tower, pumpstation and pipe work;
- Construction of a new block paving access road;
- Dry stack retaining walls;
- Top-soiling and grassing;
- Repair of existing palisade fencing;
- Construction of storm water drainage systems;
- Supplying, laying and jointing of gravity drains and overflow pipes with manholes and head walls;
- Bulk meter installation on the reservoir and elevated tower inlet and outlet pipelines;
- Planning and liaising with eThekweni Operations for shutdowns of reservoir inlet supply pipelines or reservoir outlet pipelines, including all risk assessments and method statements which are to be approved by the Employer's Representative and EWS Operations;
- Structural repairs and rehabilitation of all the damaged existing chambers and roof access openings, replacement of all damaged precast chamber access covers, reinstallation of new steel covers and frames, Replacement of padlocks and installation of safety features.
- Repair of 2 PRV chambers at Unity Avenue in Chatsworth and Locksley Drive in Sherwood. The repairs will include the following:
  - (a) Unity Avenue PRV Chamber
    - Removal of the existing roof slab and installation of new roof slab with Lid from Precast.
    - Breaking down of 6 courses of brick wall on two sides of the chamber and rebuilding of the brick wall, including an air vent on 1x side of the chamber.
    - Bag wash and paint inside the chamber
  - (b) Locksley Drive PRV Chamber
    - installation of a new roof slab with Lid from Precast
    - Breaking down of one course of the brick wall on all 4 sides of the chamber and rebuilding of the brick wall, including three new course of brick wall on all four sides of the chamber.
    - Bag wash and paint inside the chamber.

#### **Mechanical, Electrical and Instrumentation**

- Telemetry equipment instrumentation, power supply, all ducting and cabling;
- Supply and installation of 2 new horizontal single stage axially split volute casing pumps including motors and baseplates;
- Manufacturing of pump outlet manifold;
- Supply and installation of new variable speed drives (VSD) and motor control centre (MCC);
- New batteries for the UPS section incorporated into the MCC;
- Cabling from the MCC to the new VSDs;
- Separate motor junction boxes for motor power cabling and sensors/instruments cabling installed locally at the motor for ease of disconnection;
- Cabling and cable support systems from the MCC/VSD to the motor junction boxes for power to motors and instrumentation;
- New motor cable termination junction boxes at the pump motors;

- Cabling and cable support systems for instrumentation equipment including low level float switches, no flow switches, pressure sensors and level instruments in the reservoirs and elevated tank;
- Instrumentation including no flow switches on the delivery pipework of each pump and PT100 thermistors for the pumps and motors;
- Reservoir ( 3 in series ) low level floats with stainless steel chain and weights. Floats and weights must not contain mercury or lead or other un-safe products used in potable water;
- Ultrasonic level sensor and transmitters in the reservoirs (3 No) and elevated tank;
- Power supply to the new MCC at the pump station;
- Earthing of the complete electrical installation of the MCC and associated electrical installation and pumps. Separate earth wires are to be installed from the MCC to the VSDs and to the motors;
- Lightning protection and earthing to the pump station, reservoirs and elevated tank;
- Refurbishment of the existing stand-by diesel generator;
- New cabling from the stand-by generator change over panel to the new MCC;
- New lighting and small power points in the pump station including light fittings;
- Cabling and connecting the ultrasonic flow meters;
- Telemetry system integration to the SCADA system at EWS Control Room;
- Integrating the MCC to new Telemetry system including the new ultrasonic flow meters;
- Commissioning of all mechanical, electrical and telemetry equipment;

### C3.1.3 TEMPORARY WORKS

The Contractor shall carry out such temporary work, including the necessary access and construction roads, shoring of trenches and excavations etc., as he may require enabling the permanent work to be constructed. He shall allow for the cost of all temporary works, including design and their removal, in his tendered rates.

Temporary works are expected to include:

- necessary site access and deviations for traffic where the proposed works will disrupt traffic;
- shoring, dewatering and related temporary works required during excavation of trenches and excavations as required to enable the permanent works to be constructed. The design of the lateral support is to be undertaken by the Contractors Professional Engineer and included in the tendered rate. The design of the lateral support solution will be dependent on the technique used by the contractor to perform the excavation, as well as programmed to fit into the Contractors construction programme. The Contractor is to submit the detailed design for the approval and acceptance of the project geotechnical engineer;
- Any temporary support structures required to protect and maintain services;
- Any temporary pipe specials and fittings.

### C3.1.4 LOCATION OF THE WORKS AND ACCESS

The proposed Trenance 3 Reservoir site is located on Madrona Drive. Access to the proposed site will be via the M27 (Jabu Ngcobo Drive). Along the M27 turn left into Cottonwood Drive. Travel approximately 300m on Cottownwood Drive and thereafter turn right onto Madrona Drive.

The site selected for the new 6 Ml reservoir shown in **C4.1**. The existing Trenance 3 reservoir site consists of a 2.26 Ml and 1.64 Ml rectangular reservoirs, chambers and a 67 Kl circular Elevated Tower.

The site for the Trenance 3 Reservoir is fully fenced and access is controlled by the EWS Northern Area Operations.

**C3.1.5      NATURE OF GROUND AND SUBSOIL CONDITIONS**

The results of tests on ground and subsoil conditions for the Trenance 3 Reservoir Site is included in Section **C4.2**, Site Information. Trial holes may be excavated by Tenderers, (with the prior written consent of the Engineer's representative) to assist in the pricing of their excavation rates. Any trial hole shall be barricaded and shall be backfilled immediately after inspection of the soil conditions. The tenderer shall be fully liable for any claims for losses, damage or injuries arising or as a consequence of carrying out trial hole excavations for the purpose of this tender. Furthermore, the Engineer's authority for the carrying out of any exploratory excavations is subject to the Tenderer indemnifying the Employer and the Engineer against any such claims.

## **C3.2: PROJECT SPECIFICATIONS**

### **PREAMBLE**

The Project Specifications (PS) form an integral part of the contract and supplements the Standard Specifications. They contain a general description of the works, the site and the requirements to be met.

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

Any reference to "the Engineer" in this document is to be read as "the Employer's Agent" in terms of the definition 1.1.1.16 of the General Conditions of Contract for Construction Works as issued by SAICE – Third edition (2015)

### **PS 1 DESIGNS AND DRAWINGS**

#### **PS 1.1 ENGINEERS DESIGN**

The Employer is responsible for the overall design intent of the permanent works.

#### **PS 1.2 CONTRACTORS DESIGN**

The Contractor is responsible for the design of all temporary works, construction methods, and final civil, structural, mechanical, electrical, and instrumentation (MEI) designs. This responsibility includes the following:

- Preparation of shop drawings for all tie-ins and interconnecting works.
- Design and implementation of shoring and lateral support systems required for trenching, as well as measures to protect the works and existing anchor block systems.
- Preparation of method statements and designs for the removal, relocation, and/or reconstruction of infrastructure and facilities on private properties, homeowners' properties, or properties owned by parastatals affected by construction activities.
- Development and approval of welding procedures, as well as certification of welders in accordance with these procedures.
- Detailed MEI designs, including but not limited to the final equipment, drawings, quality control documents, design information, layouts, schematics, and systems integration required for the permanent works.
- Any additional designs specified by the Employer's Agent for the Contract.
- The associated designs undertaken by the Contractor are to be signed and approved by a Professionally Registered Engineer.

The Contractor is expected to ensure all designs comply with applicable standards, regulations, and best practices, and to obtain all necessary approvals prior to implementation.

#### **PS 1.3 DRAWINGS**

The drawings issued to Tenderers as part of the tender documents must be regarded as provisional and preliminary for the Tender's benefit to generally assess the scope of work and to develop his pricing strategy. These drawings are marked as "Tender Drawings".

The construction of the Works shall be carried out against drawing revisions marked as "for construction purposes". The Contractor has to ensure that he always refers to the latest construction drawing revision issued by the Engineer.

The Engineer shall, at commencement of the Contract, deliver to the Contractor, copies of the construction drawings in PDF format together with any associated instructions required for the commencement of the Works.

The Engineer may issue, from time to time, during the construction of the Works, revisions to previously issued drawings as may be required for adequate construction and completion of the Works. Such revisions will be in PDF format. The Contractor shall keep an updated drawing register for use on site.

The drawings are issued separately as Annexures to this document and issued as electronic documents (pdf), for tender purposes, are listed under **Part C3.5** on a CD for Hard Copy Tender Documents and/ or is accessible for Electronic Tender Documents obtained from the eTenders website via the web link.

The following is a list of Drawings available under this Contract:

DWG No.		DWG No.	CONTRACT No.	TITLE	SHEET No.
(CONSULTANT)		(CLIENT)	(CLIENT)		
PROJECT	No.	RESERVOIR			
D859	5000	60570/001	32269-5W	Site Plan	1 of 1
D859	5250	60570/002	32269-5W	Concrete Floor Layout and Details	1 of 1
D859	5251	60570/003	32269-5W	Reservoir Sections Concrete Outline and Details	1 of 1
D859	5252	60570/004	32269-5W	Concrete Roof Layout and Details	1 of 1
D859	5253	60570/005	32269-5W	Outlet Structure and Scour Chamber Layout and Details	1 of 1
D859	5254	60570/006	32269-5W	Inlet Chamber and Associated Pipework	1 of 1
D859	5255	60570/007	32269-5W	Elevated Tank & Details	1 of 1
D859	5256	60570/008	32269-5W	DN300 Inlet Plan & Long Section (Elevated Tower)	1 of 1
D859	5257	60570/009	32269-5W	DN200 Meter Chamber off DN 300 (Elevated Tower Outlet Pipe)	1 of 1
D859	5258	60570/010	32269-5W	Stormwater Plan & Long Section	1 of 1
PUMP STATION					
D859	5200	60570/015	32269-5W	Pumpstation Associated details	1 of 3
D859	5200	60570/015	32269-5W	Pumpstation Associated details	2 of 3
D858	5200	60570/015	32269-5W	Pumpstation Associated details	3 of 3
STANDARD DETAILS					
D859	5400	60570/020	32269-5W	Standard Details	1 of 2
D859	5400	60570/020	32269-5W	Standard Details	2 of 2
D859	5401	60570/021	32269-5W	Hinged Mild Steel Cover and Frame for 1200 x 1200mm Opening	1 of 1
D859	5402	60570/022	32269-5W	GRP Access Ladder	1 of 2
D859	5402	60570/022	32269-5W	GRP Access Ladder	2 of 2
D859	5403	60570/023	32269-5W	Standard Details Typical Trench Details	1 of 1

D859	5404	60570/024	32269-5W	Standard Details Thrust Block Details	1 of 1
D859	5405	60570/025	32269-5W	Typical DN300 Inline Meter Assembly	1 of 1
<b>ELECTRICAL DETAILS</b>					
D859	5500	60570/029	32269-5W	Electrical & Instrumentation Layout	1 of 1
D859	5501	60570/030	32269-5W	P & ID Diagram	1 of 1
D859	5502	60570/031	32269-5W	Lightning Protection & Earthing Layout	1 of 2
D859	5502	60570/031	32269-5W	Lightning Protection & Earthing Layout	2 of 2
D859	5503	60570/032	32269-5W	Pump Station Electrical, Fire & Intruder Alarm Layout	1 of 1
D859	5504	60570/033	32269-5W	Typical G.A & Line Diagram of Motor Control Panel	1 of 1

### PS 1.3.1 PIPING & INSTRUMENTATION DIAGRAMS

The Contractor shall ensure that all Piping and Instrumentation Diagrams (P&ID) developed for the project conform to the specific requirements by the Employer. The Contractor shall ensure that the P&ID diagrams comply with the following:

- All symbols, notations, and representations must conform to the Employer's standard conventions.
- The P&IDs must clearly indicate all piping systems, flow direction, control systems, instrumentation (separately indicating probe elements, transducers, transmitters, field indicators etc where applicable), control and alarm set points, hard and soft linkages and interlocks, valves, and other equipment, together with all tag numbers, as per the project requirements

The P&ID diagrams must be provided in the following formats:

- CAD Format: All P&ID diagrams must be delivered in AutoCAD or an equivalent 2D CAD format to ensure compatibility with the Employer's systems.
- Pdf Format: All P&ID diagrams must be delivered in Pdf format.
- Plant 3D Format: The P&ID diagrams must also be submitted in Plant 3D format.
  - This format should provide a 3D representation of the piping, equipment, and instrumentation. It should allow the Employer to visualize the systems in three dimensions, facilitating integration with other 3D design models, clash detection, and further design validation. The Plant 3D files must include all relevant components, with accurate spatial relationships, dimensions, and connection points, ensuring that the system layout aligns with the physical design requirements and can be integrated with other engineering disciplines.
- The cost for the P&ID's are deemed included in the tendered rates.

### PS 1.4 EQUIPMENT PS 1.4.1 GENERAL REQUIREMENTS

The Contractor shall ensure that all equipment required for the Trenanace 3 Reservoir, including process, mechanical, electrical, instrumentation, and control components, is subject to the Employer's acceptance and the Employer's Agent's approval prior to procurement and installation. The equipment planning, review, approval and delivery process must adhere to the following procedure, ensuring compliance with all project and particular specifications.

### PS 1.4.2 EQUIPMENT LIST DEVELOPMENT

The Contractor shall develop and submit a comprehensive Equipment List for all equipment to be utilized on the Contract. The Equipment List shall include, but not be limited to, the following details:

- Description of each item (e.g., pumps, valves, filtration units, electrical panels, etc.).
- Manufacturer and model number.
- Technical specifications and compliance with applicable standards (e.g., SANS, ISO).
- Proposed installation location or system integration details, referenced to the project drawings.
- Quantity of each item.
- Lead times of each item for procurement.
- Unique tag numbers or identifiers, as specified in the Project and Particular Specifications. Tag numbering shall be in accordance with the Employers specific requirements and verified by the Contractor at the commencement of the Contract.
- The Contractor shall clearly identify any additional equipment not included in the design documentation or original specifications. Each item must be defined with an explanation of its function and purpose, along with reasons for its inclusion and details on how it integrates into the existing design.
- The Equipment List shall be correlated to the project's documentation, including:
  - Equipment drawings, schematics, and system diagrams.
  - Mechanical and electrical design documents.
  - Control and instrumentation specifications.
  - Tagging system references.
  - Functional Design Specifications and P&IDs.
- The Contractor shall submit the Equipment List to the Employer for acceptance and the Employer's Agent for approval within 30 days of the contract commencement.
- The Contractor shall thereafter provide an updated Equipment List every 30 days and presented at ongoing technical meeting.

### **PS 1.4.3 SUBMISSION OF DETAILED EQUIPMENT DOCUMENTATION**

Upon approval of the Equipment List, the Contractor shall submit detailed technical documentation for each listed item that is specific for the equipment proposed and must not be generic datasheets. The documentation shall include:

- Manufacturer's data sheets, technical specifications, and catalogues.
- Detailed drawings for installation, assembly, and electrical integration, with references to the relevant tag number.
- Performance curves or other supporting test data.
- Installation and operation manuals, with reference to the tag number for each item.
- Warranty documentation and after-sales support details.
- For additional equipment not previously included in the design documentation, the Contractor shall submit a comprehensive description of the equipment's function, the justification for its inclusion, and its impact on the overall system performance.
- The detailed documentation shall be submitted to the Employer for acceptance and to the Employer's Agent for approval before procurement or installation can proceed.

### **PS 1.4.4 TECHNICAL REVIEW AND APPROVAL**

The Employer's Agent shall review the submitted documentation to ensure completeness, compliance with the contract specifications, and that the equipment aligns with the Equipment List and tagging system.

The Employer's Agent shall provide written approval or rejection of the provided documentation at a timeframe agreed with the Contractor. The minimum duration for responses shall be 20 days from the date of submission and the Contractor is to ensure this is reflected in the programme.

If the submission is rejected, the Contractor shall revise and resubmit the documentation, addressing any comments or additional requirements within 10 days of rejection.

Upon receipt of approval from the Employer's Agent, the equipment will be deemed approved, subject to any final conditions.

#### **PS 1.4.5 CONFIRMATION OF EQUIPMENT AND SUPPLIER COORDINATION**

If the Employer or Employer's Agent requires further clarity on the proposed equipment, the Contractor shall arrange a meeting with the supplier to discuss the equipment's technical specifications, integration into the system, and any necessary adjustments to meet the project's requirements, this timeframe is to be factored into the Contract Programme.

- The Contractor shall facilitate and attend this meeting with the supplier, Employer, and Employer's Agent to confirm the equipment's suitability and compliance with the contract specifications.
- The meeting shall focus on resolving any questions or concerns related to the equipment's features, its role within the overall system, Employer specific technical requirements and any potential modifications.
- Following the meeting, any required changes to the equipment shall be documented and reflected in the updated submission for approval by the Employer and Employer's Agent.
- This coordination shall occur before procurement or fabrication, with approval provided by Employer's Agent.

#### **PS 1.4.6 INSPECTION AND TESTING**

The Employer reserves the right to inspect the equipment at the manufacturer's facilities/factory to ensure compliance with the approved specifications. The total cost for this is deemed included in the tendered rates.

#### **PS 1.4.7 EQUIPMENT DELIVERY AND CERTIFICATION**

Upon delivery of equipment to site the Contractor shall ensure tags are installed on all equipment referencing the approved tag numbers and ensuring compliance with the Equipment List, project and particular specifications.

#### **PS 1.4.8 NON-CONFORMANCE AND RECTIFICATION**

Any equipment procured or installed without prior acceptance and approval, shall be considered non-compliant. The Contractor shall be responsible for all costs associated with the rectification of non-compliant equipment, including removal, replacement, and any updates to the tagging system to ensure alignment with the approved documentation.

### **PS 2 PROCUREMENT**

#### **PS 2.1 SUB CONTRACTING**

##### **PS 2.1.1 SCOPE OF MANDATORY SUB-CONTRACTING**

Mandatory sub-contracting is specified under the section dealing with Contractors Participation Goal in the Tender and Contract Data.

##### **PS 2.1.2 SELECTED SUB-CONTRACTORS**

The Employer, with the assistance of the Engineer, will prepare a detailed scope of work and or specification for the work or supply items to be executed by a Selected Sub Contractor.

The Employer and the Contractor will compile a list of firms or persons acceptable to both and who will then be invited by the Contractor to submit tenders for the required work to be carried out or goods to be supplied by Selected Sub Contractors. When the tenders are received, they will be evaluated by the Employer and the Employer will indicate which tender he requires to be accepted by the Contractor. The Contractor will be advised

accordingly. The Contractor shall then accept that Tender and appoint the relevant Selected Sub Contractor.

The Contractor shall incorporate in his sub-contract provisions the following:

- 1) In respect of the work carried out or the goods supplied that are subject to the sub contract, the Selected Sub Contractor undertakes to the main Contractor mutatis mutandis the obligations and liabilities as are imposed upon the Contractor to the Employer in terms of the Contract, and holds the Contractor harmless from and indemnifies him against the same and in respect of all claims, demands, therewith, or arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities.
- 2) The Selected Sub Contractor shall also hold the Contractor harmless from and indemnify him against the following:
  - a) Shortcomings in the sub-contract work if and where the work was designed by the Selected Sub Contractor,
  - b) Defects in the goods if and where goods were manufactured and or supplied by the Selected Sub Contractor,
  - c) Any negligence by the Selected Sub Contractor or his/her agents, workmen and/or servants,
  - d) Any misuse by the Selected Sub Contractor of any constructional Plant, temporary works or materials provided by the Contractor for the purposes of the Contract,
  - e) Any claims as aforesaid.

### **PS 2.1.3 ATTENDANCE TO SUB-CONTRACTORS**

Attendance to sub-contractors is to comply with the Conditions of Contract.

### **PS 2.2 PREFERENTIAL PROCUREMENT PROCEDURES**

For the purpose of this Contract the Contractor shall comply with the preferential procurement and CPG statement provided in F3.11 of the Tender Data. Relevant Contract Data items are applicable.

#### **PS 2.2.1 REQUIREMENTS**

The requirements are detailed in the Tender and Contract Data.

### **PS 3 CONSTRUCTION**

A range of standard specifications are referred to in this document, either as listed applicable standard specifications below or as standard specifications listed in Particular specifications and amended standard specifications.

Whilst every attempt is made to refer to all the standard specifications in the lists, it could be that other standards are referred to in the Particular Specifications or amended standard specifications without being listed in the lists. Such omission from the lists, should it occur, should not be seen as misinformation and it is to be noted that ALL standards specifications referred to in this document are applicable, whether listed or not.

It is the Contractor's duty to obtain copies of referenced standard specifications at his cost and all tendered rates shall be deemed to include for these costs.

#### **PS 3.1 APPLICABLE SANS 1200 STANDARDS**

Refer to Part C3.3

## **PS 3.2 APPLICABLE SANS SPECIFICATIONS**

Refer to Part C3.3

## **PS 3.3 APPLICABLE INTERNATIONAL STANDARD SPECIFICATIONS**

Refer to Part C3.3

## **PS 3.4 PARTICULAR SPECIFICATIONS**

Particular specifications are issued separately to this document and issued as electronic documents (pdf), for tender purposes, are listed under **Part C3.4** on a CD for Hard Copy Tender Documents and/ or is accessible for Electronic Tender Documents obtained from the eTenders website via the web link under **Part C3.4**.

## **PS 3.5 CERTIFICATION OF RECOGNISED BODIES**

Wherever possible, items and materials for construction of the Works shall comply with the relevant South African Bureau of Standards Specifications and with the British Standards where these are applicable in the absence of local standards.

The Contractor shall, when called upon by the Engineer, furnish the required Standard Specification compliance certificates.

## **PS 3.6 SITE ESTABLISHMENT**

### **PS 3.6.1 SERVICES PROVIDED BY THE EMPLOYER**

Space for office accommodation within the fenced reservoir site might be allowed. Contractor to establish adequacy of space within confines of space within fenced area.

The Employer shall be indemnified in all respects as a result of the occupation and use of the land and buildings, including any claims from third parties.

The allocated and occupied land and buildings is to be used only for site offices and for storage of materials and strictly for work pertaining to this contract.

The Contractor is fully responsible for any damage caused to the land and buildings, or improvements on it including services and for reinstating it to its former condition when vacated.

Should the Contractor want to occupy any portion of land not indicated by the Engineer, the required approval for same has to be obtained from the Engineer who will evaluate the request in terms of legislation and by laws applicable.

The Contractor shall ensure that the conditions of the EMP are met for all site offices and fabrication yards.

All tendered rates shall be deemed to include for all costs related to Site Offices and Fabrication Yards, regardless of their location.

The land and buildings used for the Contractor's camp shall be cleared and vacated by the Contractor within 14 days of the date of completion of the contract unless written permission from the Engineer is obtained to occupy the site for a longer period.

### **PS 3.6.2 FACILITIES TO BE PROVIDED BY THE CONTRACTOR**

The Contractor is responsible for:

- All Camps, Depots and Workshops as well as storage areas.
- The accommodation arrangements for Contractor's employees remain the responsibility of the Contractor in all respects. This includes arrangements for transport. See Conditions of Contract.
- Additional space requirements which cannot be accommodated on site as made available to the Contractor.

### **PS 3.6.3 STORAGE AND LABORATORY FACILITIES**

The Contractor is responsible for the provision of storage facilities.

Storage facilities shall be suitable to ensure storage of materials and equipment and Plant on site, ensuring adequate protection.

Plant and equipment shall be stored on suitably prepared hard surfaces with adequate shade cover.

There are no specific laboratory requirements to the contract except for the fact that laboratories need to be SANAS registered.

### **PS 3.6.4 OTHER FACILITIES AND SERVICES**

#### **PS 3.6.4.1 Source Of Water Supply**

The Contractor shall make his own arrangements for water supply connections for the camp sites and work fronts and shall be required to bear the cost of all water consumed at camp sites, inclusive of the connection fees. Should reticulated water not be available at any of the work locations, the Contractor shall be responsible for sourcing and storing of potable water for consumption and hygiene and water for construction purposes.

The Contractor shall make his own arrangements for water supply connections for construction purposes. The tendered rates under the individual items in the Bill of Quantities which require water for construction purposes, shall be deemed to include all the costs of water supply.

The water quality requirements for reinforced concrete needs to be met.

Water quality requirements for pipeline and structure disinfection shall be met.

The cost of water required to charge newly constructed pipeline sections for hydrostatic testing for the first time shall be borne by the Employer. (See amended specifications - Clause PSL 7). Water for any subsequent charging required, regardless of reason, shall be for the Contractor's account.

The cost of water required to fill structures for testing shall be borne by the Employer. (See amended specifications - Clause PSG). Water for any subsequent charging required, regardless of reason, shall be for the Contractor's account.

The cost for all water required for the execution of the construction of the Works shall be borne by the Contractor, excluding the costs highlighted above.

#### **PS 3.6.4.2 Source Of Power Supply**

The Contractor shall make his own arrangements for power supply connections for all camp sites and work fronts for construction purposes and he shall bear the cost of all power consumed, including the connection fees. Should it be required, the Contractor shall allow for the costs for the power supply for construction purposes, in the preliminary and general section of the BOQ.

The supply of a new power supply for telemetry equipment, if required, is a matter of specification and catered for in the contract documents.

#### **PS 3.6.4.3 Source Of Sewerage Connection**

Water-borne sewerage reticulation is not available in the area.

The Contractor shall provide at his own cost the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets only will be allowed where temporary facilities have to be provided. Such conveniences, which shall comply with Municipal regulations, shall be maintained in a clean and hygienic condition and shall be properly secluded from public view and their use shall be strictly enforced. On removal of such conveniences the sites thereof shall be left in a clean, sanitary and tidy condition.

### **PS 3.6.5 OFFICE SPACE/FACILITIES AND EQUIPMENT FOR EMPLOYER AND ENGINEER**

#### **PS 3.6.5.1 Engineer's Office:**

An office is required for the use of the Employer's Agent on site. (See SABS 1200 AB and as amended in the project specifications).

It will be a requirement of this contract that all work pertaining to the provision of the office of the Employer's Agent shall be completed in full prior to the Contractor being permitted to commence work on site.

#### **PS 3.6.5.2 Parking Facilities:**

The Contractor shall provide 4 dedicated parking areas for the Employer and the Engineer for exclusive use. Parking area to be covered with suitable covering to provide 100% shade.

#### **PS 3.6.5.3 Ablution Facilities:**

A male and female ablution facility with wash hand basis shall be made available for exclusive use for the Engineer and Employer.

### **PS 3.5.6 ADVERTISING RIGHTS AND NOTICE BOARDS**

Advertising rights remain with the Employer.

A notice board for the construction activities, should be erected at the construction site. The requirements of PSAB of SABS1200 apply.

### **PS 3.7 MATERIALS SUPPLIED BY THE EMPLOYER/CONTRACTOR**

#### **PS 3.7.1 PIPE SUPPLIED BY THE CONTRACTOR**

Pipe shall be supplied in terms of the Particular Specification for steel pipe as attached in the annexures and Project Specification.

The following schedule of technical requirements are applicable for steel pipes:

- The steel pipe under this contract shall be grade X42, 4.5mm thick spigot and socket pipe plain ended on the non-bell side for fillet welding at the bell when jointing.
- The size of the pipe, the grade of steel for the pipe and wall thickness is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- Pipe shall be ordered and delivered to site in lengths of no less than 12.192m.
- The internal lining system shall be Pipe Lining System 2: Cement Mortar Lined as per the steel pipe specification unless otherwise stated.

- The external coating system shall be Pipe Coating System 4: 3 layer polyethylene pipe coating system as per the steel pipe specification unless otherwise stated.

The following schedule of technical requirements are applicable for PVC-U pipes:

- The PVC-U pipe under this contract shall be spigot and socket pipe with integral socket and locked-in rubber ring seal
- Pipe shall be ordered and delivered to site in lengths of no less than 6.0m
- The size of the pipe and pressure ratings is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- All PVC-U pipes are to comply with SANS 966-2

The following schedule of technical requirements are applicable for PVC-M pipes:

- The PVC-M pipe under this contract shall be spigot and socket pipe with integral socket and locked-in rubber ring seal
- Pipe shall be ordered and delivered to site in lengths of no less than 6.0m
- The size of the pipe and pressure ratings is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- All PVC-M pipes are to comply with SANS 966-1

The following schedule of technical requirements are applicable for HDPE pipes:

- The HDPE pipe under this contract shall be plain ended for heat fusion/thermofusion butt welding.
- Pipe shall be ordered and delivered to site in lengths of no less than 1.83 or 2.44m
- The size of the pipe and pressure ratings is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- All HDPE pipes are to be PE100 and comply with SANS ISO 4427.

The following schedule of technical requirements are applicable for non-pressure Concrete pipes (Storm Water Pipes):

- The concrete pipe under this contract shall be spigot and socket pipe with a socket and locked-in rubber ring seal
- Pipe shall be ordered and delivered to site in lengths of no less than 6.0m
- The size of the pipe and pressure ratings is defined in the relevant items in the Bill of Quantities and is also depicted on the drawings for the Construction of the Works.
- All concrete pipes are to comply with SANS 667.

### **PS 3.7.2 PIPE YARDS AND PIPE COLLECTION**

The Contractor shall keep adequate records of his pipe upliftment activities and his pipelaying activities to ensure that he can do a pipe reconciliation of pipe material utilized. This pipe reconciliation shall be kept up to date on a weekly basis and shall form part of the permanent construction records to be incorporated into the construction dossier.

### **PS 3.7.3 VALVES**

The Contractor shall supply valves for incorporation into the Works which comply with the particular specifications for valves as attached in the annexures.

Valve technical data sheets are included in the returnable documents section. These technical data sheets have to be completed.

## **PS 3.8 CONSTRUCTION EQUIPMENT**

Construction equipment utilised for reinstatement of pipe trenches shall be suitably sized for the work at hand. Rates for backfill and compaction as entered into the BOQ, shall be deemed for full compensation of the work, regardless of whether the pipe trench backfill is listed under PSLB or the PSM series of clauses. The rates provided for backfilling and compaction of pipe trenches, whether in road reserves, in roads and road crossings or in open veld shall be deemed to have evaluated the type of plant required for the applicable work to achieve the outcomes required as stated in the specification.

## **PS 3.9 EXISTING SERVICES**

### **PS 3.9.1 LOCATION AND PROTECTION**

SANS 1921-1 Clause 4.17 has relevance and is added to herewith.

All enquiries on the latest situation with services are to be undertaken by the Contractor. The location of the services shown on the drawing by the Employer were effective at the time of design only and may have changed. Time required to confirm the latest situation with services has to be allowed for by the Contractor in his programme for construction.

Attention is drawn to the fact that whilst the position of the existing pipework/pipelines, process piping, cabling and associated infrastructure have been indicated on the drawings have been provided as accurately as possible, this information may not be completely accurate and it will be necessary for the Contractor to communicate with the associated service providers and/or Employer and to prove, trace and expose services which the Contractor has been made aware of as a result of his interaction with service providers. The Contractor shall coordinate meetings with all relevant service providers before construction commences and take all the necessary steps to ascertain the location of existing services before commencing work on any section of the Works. The rates tendered for the location of services and proving of same as well as the updating of existing records of services, shall be deemed to include for these meetings.

The Contractor shall establish at the meetings with service providers, the lead times required to update records and he shall include for this activity in his Construction Programme.

The Contractor shall take all the necessary steps to ascertain the location of existing services before commencing any section of the Works and shall exercise the greatest care when working in the vicinity of such services. Before commencing his operations in any particular area, the Contractor shall request the latest available drawings from the relevant local Service Authorities, showing the location of their services already installed. The Contractor shall ensure that adequate time is allowed for making contact with the relevant Service Authorities in order for them to respond meaningfully. The Contractor shall compare the latest service locations obtained from the Service Authorities with the drawings provided for construction and where required, such construction drawings shall be updated. The Engineer shall be notified of any changes in service locations found on the construction drawings.

The Contractor shall take all necessary steps to protect any existing works or service whatsoever, against damage which may arise as a result of his operations on Site. The Contractor shall bear the cost of the repair of damage to any known service, the possible existence of which could reasonably have been ascertained by him beforehand.

### **PS 3.9.2 WAYLEAVES**

The Contractor shall procure the required equipment which will enable him to prove services.

The Contractor shall locate existing pipes, optic fibres cables, electric cables and/or any other services by hand excavation without the use of picks, to minimise the risk of damaging existing services. The Contractor shall be held responsible for any damage caused to existing services that can reasonably be traced and located.

Whilst the location of power, telephone and optic fibre cables, as well as pipelines and other services are indicated on the plan and longitudinal section drawings, this may not be comprehensive. It is the Contractor's responsibility to obtain the latest known information on services, at all times.

It is a requirement of this contract that the Contractor exposes and proves every known service within the advance work front ahead of any work being performed, in order to determine whether its level or location clashes with the designed grading of the pipeline or with the coordinates of the proposed road alignment. All services are to be proved in conjunction with each service provider prior to excavation. Such proving shall be timed to coincide with the requirements of the programme and the limitations on the length of work fronts as specified.

The Contractor shall be required to prove each and every service, indicating X, Y and Z coordinates. Claims for delays etc. arising from the non-compliance with this requirement will not be entertained.

In addition to the marking/pinpointing of known services, the Contractor is to screen the line of the proposed excavations by means of appropriate electronic tracing apparatus for other buried services, such as pipes or cables that may not be shown in services records. All services found in this manner shall be classified as known services and shall be proved as set out above.

Service connections to individual erven are to be located and handled in a manner acceptable to the Engineer. Located and proved services are deemed to be known services.

Should any services which are not on the existing services layout drawings be located, the Contractor shall add the new information to the services layout drawings in order for the employer to update his information. All tendered rates for trench excavations and road works shall include for the location of services and the updating of services drawings for the Employer.

The top surface of all existing thrust blocks are to be proven and sufficiently protected before any excavation near these thrust blocks takes place. Such thrust blocks shall be defined as a "service".

Work is to take place alongside existing high pressure water pipelines, Transnet pipelines conveying fuel, electricity cables, fibre optic cables and the like, and this is of regional strategic importance and must therefore remain in service at all times during the construction of this project. The consequences of rupturing these pipelines or cables are severe and apart from the financial implications, possible loss of life to those working nearby and/or extensive damage to property is a real threat. The Contractor's attention is therefore drawn to the necessity to exercise due caution during construction, particularly during excavations for the pipeline and chambers.

Where work is to be undertaken beneath power lines, the Engineer shall be informed at least 21 working days in advance of such construction being carried out, so that the necessary arrangements can be verified with the authorities. The Contractor shall ensure that he is, at all times, familiar with the conditions of his wayleave approvals and shall adhere to the restrictions for working in servitude areas at all times.

Where work is to be undertaken in the vicinity of Transnet pipelines, the Contractor shall ensure that a Transnet Representative is informed at least 14 working days in advance of

such work being carried out. All the instructions issued by the Transnet Representative, related to work in the vicinity of the Transnet pipelines shall be adhered to by the Contractor at all times.

### **PS 3.9.2 RELOCATION OF EXISTING SERVICES**

It is the responsibility of the Contractor to negotiate the relocation of services with the relevant service providers.

The Contractor shall ensure that he/she commences with such negotiations well in advance in order to be able to plan and programme such work into the programme for the construction of the Works without causing a delay to the construction of the Works.

The Contractor will be responsible for the payment of initial deposits and relocation costs and will only be reimbursed for such costs from the relevant Provisional Sum item in the Bill of Materials on a re-measurable basis, once proof of relevant payments have been received by the Employer.

The Contractor is to further note that no excavation machinery may excavate within 300 mm vertically or horizontally of existing water pipelines unless otherwise agreed by the Employer's Representative, the balance of the excavation being carried out is to be done by hand or by other means approved by the Employer's Representative.

### **PS 3.9.3 WATER MAIN VALVE ACCESS**

Due to regular activity under construction work with water main valves being covered over, the Contractor shall ensure maintenance of access to all water main valves at all times. During asphalt layer work for example, after each pass by the paving machine, the valves shall be exposed and access maintained in a safe condition.

Whatever method the Contractor chooses to use for this work, the cost of raising the valve covers from existing level to ultimate level shall be paid only once, irrespective of the number of times a valve is uncovered. Spacer rings required for the height adjustment of valve covers shall be supplied by the Contractor. Before final setting in position of valve covers the Contractor shall liaise with the Employer's Agent regarding the direction in which covers shall be placed.

### **PS 3.10 PERMITS AND WAYLEAVES**

The Employer will obtain the required and necessary approvals and the Contractor will be required to comply with the relevant authorities' and land owners requirements at all times.

The Contractor will be required to take cognisance of and comply with the general wayleave and 'permission to occupy' requirements of the authorities and land owners during the construction of the Works.

The Contractor will be required to confirm that he has notified property owners and authorities of his intentions to exercise his right in terms of the relevant wayleave or "permissions to occupy" in good time before commencement of the required work on the said properties.

### **PS 3.11 PRACTICAL COMPLETION AND COMPLETION**

It is a requirement under the General Conditions of Contract that the requirements for practical completion be specified.

Practical Completion will only be considered upon final testing of the reservoir and upon all pipework having been connected and tested and commissioned and the whole system constructed under this contract having been **declared fit for purpose**.

## **PS 4 MANAGEMENT OF THE WORKS**

### **PS 4.1 APPLICABLE SANS 1921 STANDARDS**

The SANS 1921 Volumes 1, 2 and 6 - Construction and Management requirements for works standards and associated specification data are applicable.

Volume 1 – General Engineering and construction works

Volume 2 – Accommodation of traffic on public roads occupied by the Contractor (note that it is a requirement of this Contract to apply the applicable clauses in this specification to the informal road reserves and accesses as described.

Volume 6 – HIV/AIDS awareness

The following amended specification data for SANS 1921 is shown in Part C3.3.

### **PS 4.2 STANDARD AND AMENDED SPECIFICATIONS**

Standard Specifications are listed under sections C3.3.

### **PS 4.3 PARTICULAR SPECIFICATIONS**

The following is a list of Particular Specifications available under this Contract which are issued separately as Annexures to this document and issued as electronic documents (pdf), for tender purposes, on a CD for Hard Copy Tender Documents and/ or is accessible for Electronic Tender Documents obtained from the eTenders website via the web link.

#### **C3.4.1: eTHEKWINI WATER AND SANITATION PARTICULAR SPECIFICATIONS**

<b>ITEM #</b>	<b>SPEC REF</b>	<b>DESCRIPTION</b>
C3.4.1.1	PSOH	EWS OH&S: Site Specific Health and Safety Specification
C3.4.1.2	PSOH	EWS OH&S: Baseline Risk Assessment
C3.4.1.3	PEM	EWS Particular Specifications for Environmental Management
C3.4.1.4	PAA	EWS Particular Specifications for Daywork Schedule
C3.4.1.5	PCL	EWS Particular Specifications for Community Liaison Officer (CLO)
C3.4.1.6	PCL	EWS Particular Specifications for Code of Conduct
C3.4.1.7	STPIPE v13	EWS Particular Specifications for Steel Pipe
C3.4.1.8	MSS	Standard Mechanical Specifications
C3.4.1.9	GS	Standard Electrical Specifications
C3.4.1.10		EWS Network and Scada Specifications_Rev2
C3.4.1.11		EWS-Instrumentation Spec rev 4

ITEM #	SPEC REF	DESCRIPTION
C3.4.1.12		WS List of Preferred Equipment-05 December 2023-Rev 00
C3.4.1.13		Standard of Building Finishes

### C3.4.2: PROJECT PARTICULAR SPECIFICATIONS

ITEM #	SPEC REF	PARTICULAR SPECIFICATION DESCRIPTION
C3.4.2.1	WPE	Pumping Equipment
C3.4.2.2	PSECI	Electrical, Control & Instrumentation
C3.4.2.3	PSVS	Valves
C3.4.2.4	PSWM	Meters

## PS 4.4 CONSTRUCTION PROGRAMME

### PS 4.4.1 TIME FOR COMPLETION

The time for completion is stated in the Contract Data

### PS 4.4.2 PRELIMINARY PROGRAMME

The Contractor shall include in his/her tender, a preliminary programme for the construction of the works. This preliminary programme shall clearly indicate how the Contractor plans to perform the Works to completion within the time for completion as stipulated.

The Tenderer shall be deemed to have allowed in his tendered rates and in his preliminary programme for possible delays due to inclement weather as specified in the contract data.

### PS 4.4.3 PROGRAMME FOR THE CONSTRUCTION OF THE WORKS

The construction programme shall comply with the requirements of the Contract in all respects.

The following shall be included in the construction programme, in addition to the Contract requirements; as well as in its subsequent updates and adjustments as required by the Contract:

- 1) The programme shall be prepared utilising MS Project and revisions of the programme shall be issued to the Engineer in both hard copy format and electronic format. A PDF of the programme is to be provided for each submission.
  - a) The Contractor may utilise an alternative software package for managing the construction of the Works but the programme submitted to the Engineer for approval has to be in MS PROJECT format, the latest version available at the time of commencement of the Contract. The programme submitted to the Engineer for approval shall be seen as the construction programme and shall be used for all time referencing and time deliberations during construction.
  - b) Should the Contractor find that translation of his programme from a particular format into the MS PROJECT format loses essential programme elements and formatting, the Contractor shall be required to repair such discrepancies in the electronic programme version submitted to the Engineer.
- 2) Each revision of the programme shall clearly indicate the programme name, revision number, date of issue and special variances.

- 3) The programme shall show ALL work items required to execute the work where such work items shall be properly grouped by main activity, and be able to be rolled up or down, depending on which detail needs to be viewed.
- 4) The programme shall comply with the following:
  - a) The programme work items shall be properly linked to show logic and a single critical path.
  - b) The programme shall show resources and such resources need to be levelled to reflect reality at all times.
    - i) Critical milestones shall be shown.
  - c) Critical milestones are to be agreed with the Engineer.
  - d) Accurate data shall be presented in so far as key dates and milestones are concerned, including projected completion and phased completion where required.
  - e) Production rates and durations are to be reasonable and practical.
  - f) Relationships between activities need to be logical.
  - g) The programme shall not reflect ownership of float.
  - h) Sub contractor's activities are to be shown and the duration for these are to be reasonable and practical.
    - i) The programme shall reflect the intricacies of the involvement of Emerging Contractors as per the CPG requirements under this Contract as detailed in the Contract and Tender Data.
  - i) No single activity shall have a duration of longer than 28 days
- 5) The correct and applicable programme calendar shall be used at all times.
- 6) Method Statements shall be prepared and be supported by the construction programme.
  - a) The Method Statements shall support the programme and vice versa.
- 7) The programme shall clearly indicate the obligations of the Engineer and the Employer.
  - a) The Contractor's attention is drawn to the 24 hour notification period specified under SANS 1921.
- 8) The Contractor shall include in his programme for the meetings with service providers as required under this contract. Attention is drawn to the requirement to have electrical poles relocated where such relocation is part of the coordination responsibilities on the Contractor.
- 9) Performance test witnessing for equipment supplied where not manufactured in the eThekweni region requires a notification period of 14 calendar days in order for the Employer to make arrangements for his presence should he/she wish to attend.
- 10) The Contractor shall schedule work such that rehabilitation can be done during a seasonally appropriate time.
- 11) The Contractor shall allow in his programme for all the requirements pertaining to services, service proving and relocation, as stated in this specification.
- 12) The Contractor shall allow in his programme for the mechanical, electrical and instrumentation work as detailed in the particular specifications. The work shall be programmed in such a manner that this work does not become critical path work items at any stage of the execution of the Contract.
- 13) The Contractor shall pay particular attention to the requirements of submitting the electrical connection application to ESKOM or any other electricity provider timeously, ensuring that the delay in installation does not affect the completion and commissioning of the mechanical, electrical and instrumentation work.

- 14) The coordination of the tie in into the EWS Water supply and reticulation lines need to be coordinated with the requirements of EWS operations. This work shall be well planned and programmed up front, to ensure that such work does not delay the construction of the Works in general. The planning around shutdowns shall allow for a maximum shut down duration of 12 hours.
- 15) The Contractor shall schedule the construction of the Works in such a manner that all pipework constructed under this Contract is completed and tested and commissioned before commissioning commences.
- 16) attention is drawn to the requirements set out in PSG 7.3.9 for water-tightness testing, and a period of not less than twenty-one (21) days shall be allowed for water-tightness testing in accordance with the specification. The backfilling around the structures shall only be done after successful completion of the water-tightness test.

The Contractor shall deploy to site, a qualified planner who will be responsible for the programme. This programmer shall have as sole responsibility, the updating and maintenance of the programme for the construction of the Works.

#### **PS 4.4.4 WORKING HOURS**

Normal working hours are considered to be between 07h00 in the morning and 17h00 in the afternoon, Monday to Friday with full cognisance to be taken of the information in the Contract Data and the description of working days.

All road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be in place after every work session or by 17h00 of every working day, whichever occurs first. No road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be removed before 07h00.

Working after normal working hours will not be allowed, unless it is approved by the Employer's Representative as work required to be executed under extra ordinary circumstances.

#### **PS 4.4.5 WORKING OUTSIDE NORMAL WORKING HOURS**

Normal working hours are considered to be between 07h00 in the morning and 17h00 in the afternoon, Monday to Friday with full cognisance to be taken of the information in the Tender Data and the description of working days. All road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be in place after every work session or by 17h00 of every working day, whichever occurs first. No road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be removed before 07h00.

Working after normal working hours will not be allowed, unless it is approved by the Engineer as "work required to be executed under extra ordinary circumstances. The requirements of the EMP in so far as working times need to be adhered to.

The Contractor will however be required to execute work outside normal working hours due to operation criteria of EWS. Some reservoir shutdowns will be night shutdowns and the bill of quantities allows for these shutdowns. The rate shall include all additional costs required to perform the works such as security, power, lighting, workmen overtime etc.

No work will be allowed outside of normal working hours as a result of the need of the Contractor to execute work in order to improve upon his programme, as a result of the programme slipping behind schedule.

#### **PS 4.4.6 PROGRESS REPORTING AND CONTROL**

The construction programme shall be updated at least once every 14 days and shall be tracked at all times. A tracked programme report shall be submitted to the Engineer 2 working days before each and every monthly site meeting

The requirements of the General Condition of Contract for programme updating remains applicable and events requiring such updating and as specified in the Conditions of Contract might require programme update frequencies shorter than 14 days. The Conditions of Contract are to be adhered to.

Delays to the critical path of the construction programme could be claimable in terms of the Contract, should the delay be as a result of an Employers Risk. Such claims for delay, which affects the programme, shall be in terms of the General Conditions Contract. The Contractor may however experience Contractor's Risk events which could cause delays to the critical path of the programme. The Contractor shall, within 10 days of experiencing such a Contractor's Risk event, delaying the critical path of his current programme, report to the Engineer in writing what, in his opinion, caused the delay and which measures the Contractor intends putting in place, to mitigate risks of further delay.

#### **PS 4.4.7 WEATHER CONDITIONS AND RAIN DELAYS – PROGRAMME REQUIREMENTS**

The Contractor shall keep accurate and detailed records of weather conditions which shall be included in his daily diary submitted to the Engineer. Claims for extension of time due to abnormal weather which the Contractor considers to be worse than the expected normal conditions, will only be considered if fully motivated with supporting documentation. Agreement between the Engineer and the Contractor on days affected adversely by rain shall be reached on the day of such adverse effect or the first day immediately thereafter. Claims for rain delays shall not be agreed retrospectively, after the event, when the site conditions cannot be assessed applicably.

The Contractor shall note that his programme shall include for weather conditions that can be expected, based upon historical records. The number of days allowed for adverse weather conditions shall be clearly shown for each month on the construction programme (refer to Contract Data).

River/stream and wetland crossings, or any work in a stream are to be scheduled for execution during periods of least risk for flooding.

The algebraic sum for rain delays shall be applicable for the original contract duration excluding applicable EOT periods. The algebraic calculation shall commence upon receipt of instruction to commence with the works.

For the extended period of contract duration, that is for the period for which EOT had been granted in terms of applicable claims, every month shall be assessed on its merits, but Contractors have to make provision for normally expected rainfall as stipulated in the rainfall table, in their EOT claims. This means that in the extended period, claims for rainfall delay will only be entertained for excessive or abnormal rainfall, that is rainfall in excess of that stipulated in the rainfall table.

#### **PS 4.4.8 SHUTDOWNS FOR TIE INS**

Shutdowns for tie-ins of pipework to existing live systems will be complex and require meticulous planning to avoid disruptions. The maximum duration for any shutdown shall not exceed the time stipulated by the Employer, which is 12 hours for this Contract. Additionally, there must be a minimum recovery period of 2 weeks between shutdowns to ensure adequate system recovery and prevent disruption to the Employer's water supply system. The Contractor shall provide 21 days notice prior to any shuts.

All planned shutdowns must be approved by the Office of the City Manager. The Contractor must also coordinate with the EWS Bulk and Operations Team to ensure that on-site storage is maintained during the shutdown period.

The Contractor is responsible for providing all necessary documentation required by the Employer to communicate the shutdown details effectively. This includes, but is not limited to:

- Shutdown schedules and timing;
- Risk assessments and method statements.
- Mock shut with all necessary fittings and ancillaries.
- Notification to relevant stakeholders such as the Office of the City Manager, and the EWS Bulk and Operations Team.
- System recovery plans and procedures for maintaining on-site storage during the shutdown.

The Contractor must schedule the tie-in work well in advance, ensuring it is integrated into the construction programme to avoid delays in the overall project timeline and to prevent negative impacts on the Employer's water distribution system. Proper planning for the shutdowns is essential to minimize disruption to the Employer's operations.

#### Approval of Method Statements:

Lead times for the approval of method statements (including shop drawings and ancillary documentation) must be adhered to, ensuring sufficient time for review and approval before shutdown activities commence. It is thus important these are submitted well before the 21 days' notice period specified above as the normal approval period shall be considered within the contractor's control and not be considered for a contract delay event.

#### Duration of Shutdown:

The duration of shutdown must be strictly followed, with upfront planning and preparation. The Contractor shall conduct dry runs prior to actual shutdown work to ensure full readiness and identify any potential issues before the shutdown begins.

An item in the Bill of Quantities has been provided for the Contractor to price the various required shutdowns. The Contractor will be compensated for each shutdown based on the tendered rates unless otherwise agreed upon with the Employer's Representative. The shutdown rate must cover, but not be limited to, the following:

- All planning and coordination efforts, including workshopping of the method statement and recording change requests from the Employer's personnel or their agents.
- Dry runs.
- Risk assessments, method statements, and shop drawings.
- Other related works necessary to execute the shutdown safely and efficiently.

## **PS 4.5 WORK FRONTS**

Work fronts do not apply to this contract.

## **PS 4.6 QUALITY ASSURANCE**

Quality assurance and the deployment of a system to ensure quality is the responsibility of the Contractor.

The Contractor's quality assurance plan shall culminate into a quality control plan with method statements which needs to be submitted to the Engineer for approval before commencement of the Works.

Approval of the quality control plan by the Engineer does not absolve the Contractor from his responsibilities under the plan.

## **PS 4.6.1 METHOD STATEMENTS**

The Contractor shall furnish the Employer's Representative with a method statement for all construction activities and in particular, but not limited to, shut downs, night shut downs, traffic management techniques as result of construction, method of application of tape wrap systems, method of repair of external coatings, method of repair of pipe internal lining, method of effecting compaction of fill around pipe, dealing with water, blasting, etc.

Method statements shall be submitted to the Employer's Representative with the programme for construction. Method statements shall be in sufficient detail for the Employer's Representative to determine their practicality and suitability and as a minimum shall include details of construction methods, work methods, plant and equipment particulars including details of critical standby equipment.

Method statements shall refer to Quality Control plans in order to assess suitability of same for the execution of the works in terms of the set Quality Control standards.

Method statements shall be cross referenced to the relevant Quality Control documentation and upon evaluation of the programme for construction, the method statements and quality Control documentation shall support the programme in order for the Employer's Representative to realistically evaluate the programme.

The Contractor is to provide EWS operations and the Employer's Representative a method statement and risk assessment. This is to be provided to EWS Operations with a minimum 14 day notice period.

## **PS 4.7 DEALING WITH WATER**

Notwithstanding the requirements of SANS 1921, the Contractor shall take adequate precautions for the protection of the works from storm water runoff during periods of prolonged heavy rainfall. The Contractor shall be responsible for dealing with all water during construction from whatever source, and the cost of all dewatering, shall be deemed to be included in the tendered rates. The Contractor shall provide temporary storm water drainage and due cognisance must be taken of the highly erodible nature of the in situ and excavated material.

The Contractor shall be responsible for all repair works necessary to reinstate any damage caused by storm water runoff.

The Contractor shall be responsible for drawing up a Storm Water Management Plan for the handling of storm water for the duration of construction at the local site where the reservoir is being constructed and all other work fronts, if applicable. The tendered rates provided in the BOQ shall be deemed to include for all Storm Water Management issues related to the Contract at all work fronts.

The Storm Water Management Plan shall conform to the requirements of the Environmental Management Plan.

## **PS 4.8 DISPOSAL OF SPOIL AND SURPLUS MATERIAL**

Disposal of spoil and surplus material needs to conform with the requirements of the Environmental Specification and Employer's requirements.

The spoiling of excess bulk excavated material under this contract is the responsibility of the Contractor and he is responsible for identifying compliant spoil sites for the purpose of spoiling material. No overhaul is applicable to the Contract and all tendered rates are deemed to include for spoiling as required under the Contract.

## **PS 4.9 TESTING COMPLETION, COMMISSIONING AND CORRECTION OF DEFECTS**

The Contractor shall arrange for all tests required for process control to be done by a laboratory acceptable to and approved by the Employer's Representative.

The Contractor may establish his own laboratory on site, or he may employ the services of an independent registered commercial laboratory. The costs for tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing. The Contractor shall submit the results of tests carried out on materials and workmanship, to the Engineer, in terms of the agreed quality control plan.

The tests required by the specifications which are to be carried out by the Employer's Representative will be conducted as expeditiously as possible, and the Employer shall not be liable for damages caused by any delays resulting from such tests. Such required testing shall be incorporated into the Contractor's programme for the construction of the Works.

In addition, the Contractor shall supply to the Employer's Representative, free of charge, quantities of all materials which are truly representative of the materials to be used in the works for testing. Each sample shall be labelled, stating the sources of supply and the purpose for which it will be used. The Employer's Representative may, from time to time, instruct the Contractor to supply a further sample or samples to ensure that the quality of materials supplied conforms with the requirements of the Contract.

### **PS 4.9.1 LENGTH OF PIPELINES TO BE PRESSURE TESTED**

The testing regime for the pipelines constructed under this contract is detailed under the amended specifications, section PSL. Pipelines shall be completed and tested and commissioned before reservoir filling for testing commences.

### **PS 4.9.2 RESERVOIR TESTING**

The testing regime for the reservoir constructed under this contract is detailed under the amended specifications, section PSG.

### **PS 4.9.3 COMMISSIONING**

Requirements for the Commissioning of the Works is detailed in the particular specifications.

The Employer shall not take beneficial occupation before commissioning as per the requirements of this specification has not been completed and the pipeline sections constructed under the Contract have not been tested and accepted in all respects.

### **PS 4.9.4 PRACTICAL COMPLETION AND COMPLETION REQUIREMENTS**

The Contract requires that contractual requirements for Practical Completion and Completion as milestones to be achieved in the construction process, be defined. The following minimum requirements are to be met for these certifications:

#### **PS 4.9.4.1 Practical Completion**

- 1) All operations and maintenance manuals for the installed infrastructure needs to be completed and handed to the Employer for operational and maintenance purposes.
  - a) The commissioning procedures as stated in the particular specifications have to be completed.

- 2) Reservoir components and the reservoir system as a whole have to be tested and certified as acceptable and be able to accept water through inlet systems, store water and release water through the outlet systems as designed, under automatic control conditions.
  - a) By default inlet control and outlet control systems of the reservoir have to be able to run in auto mode after hot commissioning.
- 3) All associated pipelines, scour and air valve systems and isolating valve systems have to be tested and certified correct and acceptable, with chambers being secured in terms of the design and construction requirements, fully functional.
- 4) All mechanical systems have to be installed and tested and functioning as required.
- 5) All electrical & instrumentation systems have to be installed and tested and functioning as required.
- 6) Access roads shall be completed in all respects.
- 7) Stormwater systems shall be completed in all respects.
- 8) All as built drawings shall have been submitted.
- 9) All training to the Employers Personnel shall be completed to the satisfaction of the Employer.
- 10) All safety signage shall be in place and the entire works shall be safe for operation by the trained staff.

In terms of the Contract Data, the above will be tabled at the Contract kick off meeting and will be minuted.

#### **PS 4.9.4.1 Completion**

All the work specified under this Contract should be completed in terms of the requirements of the Contract before Completion will be certified.

#### **PS 4.10 REQUIREMENTS TO ACCOMMODATE TRAFFIC**

Traffic accommodation is required for access of heavy vehicles. The Contractor shall ensure that the requirements of an applicable traffic management plan are met.

#### **PS 4.11 SURVEY CONTROL AND SETTING OUT OF THE WORKS**

Survey control and setting out of the Works is covered under SANS 1921.

The Contractor shall be responsible for all survey work required to set out the works.

All survey data shall be signed off by a registered professional surveyor and tendered rates in the Bill of Quantities shall be deemed to include for all the costs associated with surveying for the construction of the Works. Registration required is with a recognised national body that controls the registration of professional surveyors in the Republic of South Africa.

##### **PS 4.11.1 SURVEY BEACONS AND CONTROL POINTS**

Survey control points will be shown to the Contractor at the time of handover of the site. Once survey control points have been pointed out, these will be signed over to the Contractor and such survey control points become the responsibility of the Contractor to maintain and protect and re-establish should it be damaged.

The Contractor shall take special precautions to protect all permanent survey beacons, survey pegs and control points, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of

the Contract. If any survey control points are disturbed by the Contractor or his employees, the Contractor shall have these replaced by a registered land surveyor at his own cost.

#### **PS 4.11.2 INITIAL SURVEY**

An initial survey of the terrain where construction activities are to take place, shall be executed in a 1.0m by 1.0m grid. This data will inter alia be utilised to calculate quantities from, as are applicable. The survey data so obtained shall form part of the records to be compiled into the Construction Dossier.

#### **PS 4.11.3 FINAL SURVEY**

A final survey of the terrain where construction activities did take place, shall at least cover a 1.0m by 1.0m grid, picking up all the constructed assets. The survey data so obtained shall form part of the records to be compiled into the Construction Dossier which will be deemed to be the permanent record for construction activities.

#### **PS 4.11.4 PHOTOGRAPHIC RECORD**

The Contractor shall prepare and submit a well indexed photographic record of the progress with the construction of the Works. The photo record shall be done in intervals of at least 7 calendar days over the full duration for the construction of the Works. The photographic record shall include for drone imagery as directed by the Engineer.

The format of the indexed photographic system shall be agreed with the Engineer at the commencement of the Contract.

A provisional sum has been provided in the Schedule of Quantities to cover the cost of progress photographs and enlargements as directed by the Engineer. The Contractor shall provide good quality colour photographs as directed by the Engineer. The Contractor will be required to pay the supplier directly for these items and will be reimbursed by the Employer on submission of the original invoices to the Engineer.

#### **PS 4.11.5 AS BUILT RECORDS AND RECORDS DRAWINGS**

Any information in the possession of the Contractor which is necessary for the completion of the "as built" drawings must be submitted and approved by the Employer's Representative before he will issue a Completion Certificate.

The Contractor is responsible for as-built point data capturing and redlining the pipework drawings for each installation and the Contractor shall:

- 1) mark-up, in RED, all the conflicting information on drawings as far as non-conformance with specifications is concerned, probable different site conditions encountered compared to what has been anticipated, differences in services locations encountered compared to what is indicated on the drawings and/or approved changes in design as instructed by the Engineer.
- 2) Any construction and or installation detail differing from that on the provided drawings shall be marked up.
- 3) The marking up of the Engineer's drawings shall be on one of the A0 drawings issued in hard copy and shall reference any relevant site queries and sketches. Upon completion of the works, the updated information must be forwarded to the Engineer for incorporation into the Construction Dossier for which a full set of final Record Drawings will be prepared.
- 4) The drawings which the Contractor updates and which are marked up in RED shall be clearly marked in RED, in the top left hand corner, to reflect the words "RECORD DRAWING". Should any specific drawing not require any amendments, it will be marked in RED in the top left hand corner to reflect the

words "RECORD DRAWING – NO AMENDMENTS". The Contractor shall therefore submit to the Engineer, a full set of record drawings in A0 format, marked up in RED.

- 5) All marked up in red drawings shall be submitted as a prerequisite for Completion certification.

**The Contractor may only backfill on instruction by the Employer's Representative and shall not backfill before the As-Built point data is captured.**

The Contractor shall submit each "As Built" data point to the Employer's Representative which shall be suitably coded and identifiable and be supplied on a computer disk in an ascii file or .csv file in tabulated format with the following column headings:-

Code  
X Co-ordinate  
Y Co-ordinate  
Level (msl)  
Description

The above information is to be given to an accuracy of three decimal places and is to be surveyed by a suitably qualified person. It is imperative that the surveyor utilises the nearest survey control point and notifies us thereof. The survey shall be undertaken in WGS84 LO31 projection.

#### **PS 4.11.6 AS BUILT POINT ACCURACY**

Survey of pipelines, bends, specials and fittings to accuracy of less than 100mm by a Professional Register Surveyor.

The Contractor will be required to prove the accuracy of the GPS device he intends on using prior to any as built data being captured. The Employer's Representative may request further accuracy tests during the Contract should he deem it necessary.

Suitable checks on the accuracy of the information provided may be carried out by the Employer's Representative and should any of the information provided be found to be inaccurate or untrue, the Employer's Representative reserves the right on behalf of the Employer to withhold payment or to employ the services of an engineering surveyor to re-survey all the works listed above, at the Contractor's expense.

The Employer shall request a minimum of three quotations from three independent engineering surveyors of his choice, and the lowest quotation will be appointed and the cost thereof will be deducted from monies owing to the Contractor.

#### **PS 4.11.7 AS-BUILT DATA TO BE CAPTURED**

Item	Description	Co-Ordinates and Levels for the following
Pipelines	Positions and levels of buried and above ground pipes, valves, specials and fittings installed.	<ul style="list-style-type: none"> <li>Centre of crown of pipes, bends, tee's, reducing tee's and reducers;</li> <li>All flanges;</li> <li>All welds;</li> <li>Stem of buried isolation valves;</li> <li>Centre of Water Meters and PRVs;</li> <li>Pipelines to be surveyed every 6m and/or every change in direction</li> <li>Crown of all pipe jacks/ horizontal directional drilling sleeves</li> </ul>
Cabling		<ul style="list-style-type: none"> <li>Cable routes and associated details</li> </ul>
Chambers	Position of all Chambers	<ul style="list-style-type: none"> <li>All corners</li> <li>Location of pipe entry and exit from</li> </ul>

Item	Description	Co-Ordinates and Levels for the following
		<ul style="list-style-type: none"> <li>chamber from centre of crown of pipe Floor Level</li> </ul>
Structures	Position of Reservoir	<ul style="list-style-type: none"> <li>All corners of floor</li> <li>All corners of roof</li> </ul>
Equipment	Position of equipment	<ul style="list-style-type: none"> <li>All positions of equipment on site</li> <li>For the pump station these drawings shall include individual mechanical, electrical and C&amp;I equipment/panel layout separately as well a coordinated drawing should all disciplines on a single set of drawings.</li> </ul>
Mechanical	Position of Mechanical equipment	<ul style="list-style-type: none"> <li>Centre line (masl) of pumpsets,</li> <li>All pipework information as specified in "Pipelines"</li> <li>centre line (masl) of pressure gauges/transmitters</li> </ul>
Electrical	Position of Electrical equipment	<ul style="list-style-type: none"> <li>MCC GA, wiring diagrams, SLD Instrumentation</li> </ul>

The Contractor shall show that all infrastructure is located within the servitude boundaries.

For other infrastructure, the Contractor shall ensure that all infrastructure constructed under the Contract is shown on the as built survey.

## PS 4.12 MANAGEMENT OF THE ENVIRONMENT

The requirements of the Environmental Management Specifications and where applicable, Environmental Management Programme and the Rehabilitation Specification, shall apply.

The Contractor shall for the construction of the Works, confine his operation to an area as small as possible. No disturbance of vegetation shall commence without approval of the Engineer. The planning for such disturbance shall be captured in the quality control plan for the construction of the Works.

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

## PS 4.13 SECURITY

The Contractor is responsible for all security measures required on site and at work fronts of the linear development component of the construction of the Works.

All costs required for security measures taken on site shall be deemed to be covered in the billed rates of the Bill of Quantities.

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

An item has been included in the Schedule of Quantities for the provision of security.

## PS 4.14 SITE PERSONNEL

It shall be noted that the Contractor will be required to strictly observe his obligations regarding adequate full time superintendence of the works, with particular reference to accuracy of setting out, excavations, correct steel fixing, properly constructed formwork, positioning of foundation bolts and /or bolt pockets, placing of concrete, etc in order to achieve the high standard of workmanship required of him.

It shall be a requirement of this contract that **both a Construction Manager and a site foreman** are assigned to this contract on a full-time basis and are permanently on site. The Contractor is to also ensure that a suitably qualified Contracts Manager is appointed for the duration of this Contract.

**The Construction Manager may not leave the works whilst work is in progress without the Engineer's written approval.**

#### **PS 4.15 MANAGEMENT MEETINGS**

The Contractor and Sub-Contractors shall attend regular site meetings as and when these are required by the Employer. The objectives of such meetings will be to review progress and ensure compliance with the programme, discuss, and where possible solve any problems that may arise and generally liaise with all parties concerned with the works.

The cost of attending such meetings shall be included in the tendered price and instructions given by the Employer's Representative at such meetings and confirmed in the notes of the meeting shall be considered as a written instruction by the Engineer, as referred to in the Contract.

Site Meetings will generally be held once a month, but special meetings may be convened as and when required.

#### **PS 4.16 DAILY RECORDS**

The Contractor shall keep a daily site diary in which at least but not limited to the following data will be reflected:

- 1) Work executed
- 2) Plant and machinery deployed on site
- 3) Rainfall recorded
- 4) Agreement to rain delays
- 5) Disruptions and frustrations recorded for the day

The daily diary shall be submitted to the Engineer on a daily basis. The previous day diary shall be with the Engineer by 10h00 on the following working day.

Daily diaries shall be in the format as agreed with the Engineer.

Daily diaries need to be signed by the Contractor's Representative and the Engineer.

#### **PS 4.17 FORMAT OF COMMUNICATIONS**

Formal communication under this Contract shall comprise the issue and receipt of the following:

- 1) Official correspondence issued under transmittal slip, which includes claim and dispute documentation as required by the contractual processes
- 2) Issue of Site Instructions by the Engineer
- 3) Variation Orders issued by the Engineer
- 4) Requests for information submitted by the Contractor to the Engineer, in writing in a pre-determined format

- 5) Notes on meeting proceedings, signed off by attending organisations' representatives

NOTE: random e mail correspondence generated and distributed does not constitute official correspondence and communication under this Contract.

#### **PS 4.18 PAYMENT CERTIFICATES**

Measurement for payment purposes will take place between the 20<sup>th</sup> and 25<sup>th</sup> of each month. The Contractor needs to submit his monthly payment claim to the Engineer by the 26<sup>th</sup> of each month. The Engineer and the Employer's Representative will review the Certificate for accuracy and completeness.

Should any of these noted dates fall on a non-working day or a special non-working day, the following working day shall be applicable.

#### **PS 4.19 EMPLOYMENT OF LOCAL LABOUR AND JOB CREATION**

Employment of local labour is detailed in the Contract and Tender Data.

##### **PS 4.19.1 LOCAL LABOUR STATISTICS**

The Contractor shall provide, on a monthly basis, together with his payment claim, the statistics of all labour employed under the Contract where such statistics shall as a minimum, show for each employee, the name, ID number, address, age, gender, disability level if applicable. A certified copy of the employee's ID book cover page is required as well.

The FTE statistics for the Contract needs to be submitted on a monthly basis.

This is required to comply with relevant EPWP requirements

#### **PS 4.20 EXPERIENTIAL TRAINING FOR STUDENTS**

Experiential training of students does not apply to this contract.

#### **PS 4.21 HEALTH AND SAFETY**

##### **PS 4.21.1 EMPLOYERS HEALTH AND SAFETY PLAN**

The Employer's Health and Safety Specification is included in Part C3.4: Particular Specifications.

##### **PS 4.21.2 CONTRACTORS HEALTH AND SAFETY PLAN**

The Contractor's Health and Safety plan shall comply with the requirements of the legislation applicable.

The Contractor, shall, immediately after appointment for the construction of the Works, make contact with the Employer's appointed Health and Safety agent and familiarise himself with the requirements of the Health and Safety plan for the construction of the Works.

The appointed Health and Safety Representative for the Employer will be introduced at the hand over meeting for the Contract.

##### **PS 4.21.3 COST OF COMPLIANCE WITH THE RELEVANT STATUTORY REQUIREMENTS**

An item has been inserted in the preliminary and general section of the Bill of Quantities for costs pertaining to compliance with the statutory requirements pertaining to Health and Safety. Rates provided under this contract are deemed to cover all costs applicable to Health and Safety compliance.

#### **PS 4.21.4 BARRICADING AND LIGHTING**

Barricading and lighting is covered under the amended specification section PSD and SANS 1921.

#### **PS 4.21.5 TRAFFIC CONTROL**

See SANS 1921 and the traffic control management plan as included under the particular specifications.

#### **PS 4.21.6 AIDS AWARENESS**

Refer to SANS 1921 – Vol 6.

#### **PS 4.21.7 OPERATIONAL HEALTH AND SAFETY**

A provisional sum has been provided in the Schedule of Quantities to cover the cost of Operational Health and Safety (OH&S) monitoring as directed by the Employers Representative. The Contractor shall remunerate an external Operational Health and Safety Officer appointed by the Engineer for the following:

- 1) Monthly OH&S audits, report preparation & submission;
- 2) Conducting OH&S Inspections and attend progress meeting;
- 3) Conducting a close - out inspection, issuing of snag list, verify snags closed - out for works completion and the submission & preparation of a close - out report;
- 4) Disbursements;

Any additional works required by the Employers Representative.

##### **PS 4.21.7.1 Working under or in close proximity of overhead powerlines**

All relevant Health and Safety procedures and precautionary measures pertaining to working in the Eskom servitude or under or in close proximity of overhead powerlines shall be implemented.

The services of a cathodic protection specialist shall be obtained in order to develop the relevant procedures to be incorporated into the health and safety plan.

No additional payment for these requirements will be made and the rates provided for the laying of the pipelines shall be deemed to include for all the relevant eventualities in this regard.

#### **PS 4.22 ACCESSIBILITY TO SITE**

It is the Contractors responsibility to ensure access to site for all applicable plant and machinery. The Contractor shall be responsible for liaison with the applicable land owners to confirm access to site. The Contractor shall also ensure that the existing access roads are maintained and where necessary (post Employer and landowner approval) regrade, resurface or widen the existing access road to the site. The Contractor shall ensure that all applicable environmental requirements/regulations are adhered to, as well as applicable wayleaves.

#### **PS 4.23 PUBLIC RELATIONS OFFICER (ISD CONSULTANT )**

The Contractor shall have a full time Institutional and Social Development (ISD) Consultant to deal with all public relations that concern themselves with all aspects of Public Relations and Communication as set out in this Specification. The issues to be addressed by the Contractor shall include, but is not limited to:

- 1) Attend public meetings as and when required.
- 2) Liaise with the public on construction progress. (Ability to communicate in Zulu and English)
- 3) Set out to interact with the public on a one on one basis when required and liaise with the public on construction progress this also includes arranging of public 5.8
- 4) Act as the CLO throughout the project across all wards.
- 5) Facilitate emerging contractors.
- 6) Labour procurement and labour desk related activities facilitate discussions between the Contractor and community through available structures; Support to labour desk officer.
- 7) Ensure that communities play their role during construction, which includes inter alia, protecting the works for the appointed contractor to implement the project within the stipulated timeframes.
- 8) Assist the appointed contractor's supervisory staff in the management of workers. Resolving disputes between the appointed Contractor, workers and community.

The ISD will be reimbursed from a Provisional Sum Item under Section 1: Preliminary and General.

#### **PS 4.24      ADDITIONAL SPECIALISED ENGINEERING SERVICES**

A provisional sum has been provided in the Schedule of Quantities to cover the cost of any additional specialised engineering as appointed by the Engineer

#### **PS 4.25      PROCEDURE FOR METER INSTALLATION AND REGISTRATION**

The Contractor will be responsible for the following procedure for installation of electromagnetic meters:

- 1) Inform Bulk Metering Technician for EWS of intention to install a reservoir meter. The following information must be provided in writing to bulk metering Technician:
  - a) Meter number
  - b) Meter size
  - c) Meter type
  - d) Property Key were meter is installed
  - e) Physical address where meter is installed
- 2) The Bulk Meter Technician will ensure that the above data is captured and will provide a "Connection Number"
- 3) Bulk Metering Technician or a representative is to be present at the commissioning of the meter, where an opening meter reading will be taken and returned for capturing to the billing system.
- 4) Technician (or representative) signs over acceptance of the meter and a "Connection Number" is provided for the meter and stencilled onto the chamber or kiosk.
- 5) For record drawing purposes, a GPS shape file is to be provided of all the installed meters with the above information included.

### **C3.3: STANDARD SPECIFICATIONS**

This section deals with the applicable standard specifications and amendments thereto for project specific applicability.

The standard specifications are listed as a guideline and omission of any specification if applicable, does not mean the specification requirements are excluded.

The Construction of the Works shall comply with relevant and applicable standard specifications in all respects.

### C3.3.1: STANDARD SABS PROJECT SPECIFICATIONS – SANS 1200

The standard technical specifications on which this contract is based are the South African Bureau of Standards Standardized Specifications for Civil Engineering Construction SABS 1200.

Although not bound in, nor issued with this document, the following sections of the Standardised Specifications of SABS 1200 shall form part of this Contract. The standard SABS 1200 specifications are amended under **Part C3.3.4** as required.

Specification	Series	Year	Title
SABS 1200	A	1986	General
SABS 1200	AB	1986	Engineer's Office
SABS 1200	C	1980	Site clearance
SABS 1200	D	1988	Earthworks
SABS 1200	DB	1989	Earthworks (pipe trenches)
SABS 1200	DK	1996	Gabions and Pitching
SABS 1200	DM	1981	Earthworks (Roads, Sub grade)
SABS 1200	G	1982	Structural Concrete
SABS 1200	HA	1990	Structural Steelwork (Sundry Items) including GRP
SABS 1200	L	1983	Medium pressure pipeline
SABS 1200	LB	1983	Bedding (pipes)
SABS 1200	LC	1981	Cable Ducts
SABS 1200	LD	1982	Sewers
SABS 1200	LG	1983	Pipe Jacking
SABS 1200	LE	1982	Stormwater Drainage
SABS 1200	M	1996	Roads General
SABS 1200	ME	1981	Sub-base
SABS 1200	MF	1981	Base
SABS 1200	MH	1981	Asphalt base and surfacing
SABS 1200	MK	1983	Kerbing and channeling
SABS 1200	MM	1984	Ancillary Works

### C3.3.2 APPLICABLE SANS SPECIFICATIONS

The following SANS specifications are referred to in this document or are applicable to the Contract and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria. The standards are not limited to those listed below and the Contractor shall obtain copies of all SANS specifications relevant to the Contract, at their own cost.

Specification	Year	Title	Applicable to:
SANS 28	2010	Metal ties for cavity walls	PA Brickwork
SANS 62 - 1	2013	Steel Pipes Part 1 – Pipes suitable for threading and of nominal size not exceeding 150mm	PSL
SANS 62 - 2	2009	Steel Pipes Part 2 – Screwed pieces and pipe fittings of nominal size not exceeding 150mm	PSL
SANS 0100 - 2	2014	The Structural use of Concrete - Materials and execution of work	PSG
SANS 0102 - 1	2013	The selection of pipes for buried pipelines - General Provisions	PSLB
SANS 120	2009	Stemming for use in blasting	PSD
SANS 121	2011	Hot dip galvanised coatings on fabricated iron steel articles – Specification and Test Methods	PSL

Specification	Year	Title	Applicable to:
SANS 135	2011	Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium	PSL
SANS 136	2008	Metallic Coatings – Electrode deposited coatings of nickel	PSL
SANS 227	2007	Burnt Clay Masonry Units	PA Brickwork
SANS 307		Bituminous binders for road construction and maintenance	PSMH
SANS 309	2004	Anionic bitumen road emulsions	PSMH
SANS 509	2007	Pallet trucks - Principal Dimensions	PSG
SANS 548	2003	Cationic bitumen road emulsions	PSMH
SANS 657	2011	Steel tubes for o-pressure purposes Part 1: Sections for scaffolding, general engineering and structural applications	PSMM
SANS 664 - 1	2011	Wedge gate and resilient seal valves for waterworks: Part 1: General	PSL
SANS 664 - 2	2011	Wedge gate and resilient seal valves for waterworks: Part 2 Wedge gate valves	PSL
SANS 664 - 3	2011	Wedge gate and resilient seal valves for waterworks: Part 3 Resilient seal valves	PSL
SANS 665-1	2012	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 1	PSL
SANS 665-2	2011	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 2 - Wedge Gate Valves	PSL
SANS 665-3	2011	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 3 - Resilient Seal Valves	PSL
SANS 675	2009	Zinc coated fencing wire	Gabion work, General works
SANS 676	2010	Reinforced concrete pressure pipes	PSL, PS�D, PSLE, PS�G
SANS 677	2010	Concrete non – pressure pipes	PSLE, PS�G
SANS 719	2008	Electric welded low carbon steel pipes for aqueous fluids (large bore) (200mm nominal bore to 2230mm)	PSL
SANS 763	1997	Specifying hot dipped galvanising	PSG, PSMM
SANS 830	2009	Performance standards in building - Principles for their preparation and factors to be considered	PSG
SANS 863	2011	Continuous totalizing automatic weighing instruments - Belt weighers	PSG
SANS 878	2012	Ready mixed concrete	PSG
SANS 929	2008	Plywood and composite board	PSLE
SANS 966-1	2014	Components of pressure pipe systems Part 1: Unplasticized poly(vinyl chloride) (PVC-U) pressure pipe systems	PSLC, PSLE
SANS 966-2	2013	Components of pressure pipe systems Part 2: Unplasticized poly(vinyl chloride) (PVC-M) pressure pipe systems	PSL
SANS 974-1		Rubber gaskets	PSLE
SANS 1083	2006	Aggregates from natural resources – Aggregates for concrete	PSG, PSMF
SANS 1085		Concrete testing	PSG
SANS 1090	2009	Aggregates from natural resources - Fine aggregates for plaster and mortar	PA Brickwork
SANS 1117	2007	Plastic wrappings for the protection of steel pipelines	PSL
SANS 1123	2017	Pipe Flanges	PSL
SANS 1215	2008	Concrete masonry units	PSLE

Specification	Year	Title	Applicable to:
SANS 1217	2015	Internal and external organic coating protection of buried steel pipelines	PSL
SANS 1294	2012	Precast concrete manhole sections and components	PS, PSL, PSG, PSLC, PSD, PSLE
SANS 1491 - 1 Super	2005	Portland cement extenders - Ground granulated blast furnace slag (GGBS)	PSG
SANS 1491 - 2 Super	2005	Portland cement extenders - Pulverised Fly Ash (PFA)	PSG
SANS 1491 - 3 Super		Portland cement extenders- Condensed Silica Fume (CSF)	PSG
SANS 1529		Mechanical Water meters - potable water	PSL
SANS 1551 - 1	2008	Check valves (flanged and wafer types): Part 1: PN Series	PSL
SANS 1580	2005	Hexagonal steel wire mesh gabions and rivet mattresses	PSDK
SANS 1671-1	2007	Welding of Thermoplastics - Machines and equipment - Heated tool welding	PSL
SANS 1700-1 - 1	2010	Fasteners Part 1: Terminology and nomenclature Section 1: Bolts, screws, nuts and accessories	PSL, PSH, PSHA
SANS 1700-2 - 1	2003	Fasteners Part 2: Screw threads Section 1: ISO general purposes screw threads - Basic profile - Metric screw threads	PSL, PSH, PSHA
SANS 1700-4 - 1	2003	Fasteners Part 4: Tolerances Section 1: Tolerances for fasteners - Bolts, screws, studs and nuts - Product grades A, B and C	PSL, PSH, PSHA
SANS 1700-5 - 1	2011	Fasteners: Part 5: General requirements and mechanical properties: Section 1: Mechanical properties of fasteners made of carbon steel and alloy steel - Bolts, screws and studs	PSL, PSH, PSHA
SANS 1808 - 1	2017	Water supply and distribution system components - Metallic compression type pipe couplings	PSL
SANS 1808-13	2009	Water supply and distribution system components: Part 13: Diaphragm valves	PSL
SANS 1808-15	2011	Water supply and distribution system components: Part 15: Mechanical backflow-prevention devices	PSL
SANS 1808-31	2010	Water supply and distribution system components: Part 31: Automatic control valves	PSL
SANS 1849	2008	Butterfly valves for general purposes	PSL
SANS 1914	2002	Targeted Construction Procurement. Part 1 – Participation of targeted enterprises	CPG req
SANS 1921 – 1	2018	Construction and Management Requirements for Works Contracts Part 1: General Engineering and Construction Works and where accommodation of traffic is involved	PS
SANS 1921 - 2	2018	Construction and Management Requirements for Works Contracts Part 2: Accommodation of Traffic on Public Roads Occupied by the Contractor	PS
SANS 1921 - 3	2018	Construction and Management Requirements for Works Contracts Part 3: Structural Steelwork	PS
SANS 1921 - 4	2018	Construction and Management Requirements for Works Contracts Part 4: Third party management support in works contracts	PS
SANS 1921 - 5	2004	Construction and Management Requirements for Works Contracts Part 3: Earthworks activities which are to be performed by hand	PS

Specification	Year	Title	Applicable to:
SANS 1921 - 6	2004	Construction and Management Requirements for Works Contracts Part 6: HIV/AIDS Awareness	PS
SANS 3001		General Civil Engineering test methods	
SANS 3001-C03 - 2	2015	Civil Engineering test methods - Part C03-2: Concrete durability index testing - Oxygen permeability test	PSG
SANS 3001-C03 - 3	2015	Civil Engineering test methods - Part C03-3: Concrete durability index testing - Chloride conductivity test	PSG
SANS 3001-GR55	2012	Civil Engineering test methods - Part GR55: Determination of the wet-dry durability of compacted and cured specimens of cementitious stabilised materials by hand brushing	PSG
SANS 6085		Testing of Concrete	PSG
SANS 4074	2003	Natural latex rubber condoms – Requirements and test methods	SANS 1921, PS
SANS 4427 - 1	2008	Plastic piping systems - Polyethylene (PE) pipes and fittings for water supply - Pipes	PSL
SANS 4427 - 2	2008	Plastic piping systems - Polyethylene (PE) pipes and fittings for water supply - Pipes	PSL
SANS 4427 - 3	2008	Plastic piping systems - Polyethylene (PE) pipes and fittings for water supply - Fittings	PSL
SANS 5772	2004	Preparation of steel substrates before the application of paints and related products – surface roughness characteristics of blast cleaned steel surfaces – Profile of blast cleaned surfaces determined by a micrometer profile gauge	PSL, PSH, PSHA, PA Corrosion Protection
SANS 5836	2007	Effect of fine and coarse aggregate on the shrinkage and expansion of cement: aggregate mixes (mortar prism method)	PSG
SANS 6085	2006	Concrete tests - Initial drying shrinkage and wetting expansion of concrete	PSG
SANS 8779	2010	Plastic pipe systems - Polyethylene (PE) pipes for irrigation - Specifications	PSL
SANS 10064	2011	The preparation of steel surfaces for coating	PA Corrosion Protection
SANS 10104	1991	Handrailing and balustrading (safety aspects)	PS
SANS 10129	2006	Plastic tape wrapping of steel pipelines	PSL
SANS 10164-1	1980	The structural use of masonry Part 1: Unreinforced masonry walling	General work
SANS 10268	2009	Welding of thermoplastics - Welding processes - Heated tool welding	PSL
SANS 10270	2015	Welding of thermoplastics - Approval of welding procedures and welds	PSL
SANS 10329	2012	The design and construction of sectional steel tanks for storage of liquids at or above ground level	PS
SANS 10313	2012	Protection against lightning - Physical damage to structures and life hazard	PS
SANS 10396	2003	Implementing Preferential Construction Procurement Policies using Targeted Procurement Procedures	PSL
SANS 16422	2016	Pipes and joints made of orientated unplasticised poly(vinyl chloride) (PVC-O) for the conveyance of water under pressure - Specifications	PSL

Specification	Year	Title	Applicable to:
SANS 50196 - 1	1994	Methods of testing cement Part 1: Determination of strength	PSG
SANS 50196 - 2		Methods of testing cement Part 2: Chemical Analysis of cement	PSG
SANS 50196 - 3	1994	Methods of testing cement Part 3: Determination of setting times and soundness	PSG
SANS 50196 - 4	1993	Methods of testing cement Part 4: Quantitative Determination of constituents	PSG
SANS 50196 - 5	1994	Methods of testing cement Part 5: Pozzolanicity for pozzolanic cement	PSG
SANS 50196 - 6	1989	Methods of testing cement Part 6: Determination of fineness	PSG
SANS 50196 - 7		Methods of testing cement Part 7: Methods of taking and preparing samples of cement	PSG
SANS 50413 - 1	1994	Masonry cement: Composition, specifications and conformity criteria	PSG
SANS 50413 - 2	1994	Masonry cement: Part 2: Test methods	PSG
SANS 50197 - 1	2013	Cement Part1: Composition, specifications and conformity criteria for common cements	PSG
SANS 50934 - 2	2001	Admixtures for concrete, mortar and grout: Part 2: Concrete admixtures, Definitions, requirements, conformity, marking and labelling	PSG
SANS 50934 - 6	2011	Admixtures for concrete, mortar and grout Part 6: Sampling, conformity control and evaluation of conformity	PSG
SANS 51317 - 2	2009	Road restraint systems Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers.	PSMM, PS
SANS 53263 - 1	2011	Silica fume for concrete Part1: Definitions, requirements and conformity criteria	PSG
SANS 53263 - 2	2011	Silica fume for concrete Part 2: Conformity evaluation	PSG

### C3.3.3 APPLICABLE INTERNATIONAL SPECIFICATIONS

The following international specifications are referred to in this document and/or are relevant to the Contract and the Contractor is to obtain copies from the relevant authorities as required for the execution of the Works. The standards are not limited to those listed below and the Contractor shall obtain copies of all SANS specifications relevant to the Contract, at their own cost.

Specification	Year	Title	Applicable to:
ACI 1305 R-77		Recommended practice for hot weather concreting	PSG
ANSI/API 5L: latest edition at time for tender		Specification for Line Pipe.	PSL
API 1104: 20th edition		Welding of Pipelines and Related Facilities.	PSL
ASTM A234/A234M-11a		Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service	PSL
ASTM C232-99		Standard Specification for Chromium-Vanadium Alloy Steel Valve Spring Quality Wire	PSG
BS 10	2009	Flange drilling patterns	PSL
BS 1200	1976	Specification for building sand from natural resources	PA Brickwork
BS 1387		Non alloy steel tubes suitable for welding and threading	PSHA

Specification	Year	Title	Applicable to:
BS 1881:124	2015	Testing concrete: Methods for analysis of hardened concrete	PSG
BS 2571	1990	Specification for general purpose flexible PVC compounds for moulding and extrusion	PSL
BS 5135	1984	Specification for Arc welding of carbon and carbon manganese steels	PSG
BS 5155 Super	1984	Specification for butterfly valves	PSL
BS 534	1990	Steel pipes, joints and specials for water and sewage	PSL
BS 537		Specification for low carbon 17/12 chromium-nickel-molybdenum corrosion-resisting steel sheet and strip (500Mpa)	PSL
BS 4504		Flange drilling patterns	PSL
BS EN 485-2	2016	Aluminium and aluminium alloys. Sheet, strip and plate Mechanical properties.	PSMM
BS EN 593	2017	Industrial valves. Metallic butterfly valves for general purposes	PSL
BS EN 1092	2018	Flanges and their Joints – Circular flanges for pipes, valves, fittings and accessories, PN designated steel flanges	PSL
BS EN 10224	2002	Non alloy steel tubes and fittings for the conveyance of water and other aqueous liquids	PSL
BS EN 10240	1998	Internal and or external protective coatings for steel tubes. Specification for hot dipped galvanized coatings applied in automatic plants	PSL, PA Corrosion Protection
BS EN 10311	2005	Joints for the connection of steel tubes and fittings for the conveyance of water and other aqueous liquids	PSL
EN 197-1	1992	Cement Part 1 - Composition, specifications and conformity criteria for common cements	PSG
ISO 1133-1	2011	Plastics - Determination of the melt mass flow rate (MFR) and melt volume flow rate (MVR) of thermoplastics - Part1: Standard method	PSL
ISO 1456	2009	Metallic and other inorganic coatings - Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and copper plus nickel plus chromium	PSL, PSH, PSHA
ISO 1458	2002	Metallic coatings: Electrodeposited	PSL, PSH, PSHA
ISO 1461	2009	Hot dipped galvanised coatings on fabricated iron and steel articles - Specifications and test methods	PSL, PSH, PSHA
ISO 4074	2014	Natural rubber latex male condoms	SANS 1921, PS
ISO 4427-1	2019	Plastic piping systems for water supply and for drainage and sewage under pressure - Polyethylene (PE) - Part 1: General	PSL
ISO 4427-2	2019	Plastic piping systems for water supply and for drainage and sewage under pressure - Polyethylene (PE) - Part 2: Pipes	PSL
ISO 4427-3	2007	Plastic piping systems - Polyethylene (PE) pipes and fittings for water - Part 3	PSL
ISO 4998	2014	Continuous hot dip zinc coated carbon steel sheet of structural quality	PSL, PSH, PSHA
ISO 8501-1	2007	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings	PSL, PSH, PSHA

Specification	Year	Title	Applicable to:
ISO 8503-1	2012	Preparation of steel substrates before application of paints and related products - Surface preparation methods - Part1: General principles	PSL, PSH, PSHA
ISO 8504-1	2019	Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast cleaned steel substrates - Part1: Specification and definitions for ISO surface profile comparators for the assessment of abrasive blast cleaned surfaces	PSL, PSH, PSHA
ISO 3575	2016	Continuous hot dip zinc coated carbon steel of commercial, lock forming and drawing grades	PSH, PSHA
ISO 12176-1	2107	Plastics pipes and fittings - Equipment for fusion jointing polyethylene systems - Part 1: Butt fusion	PSL
ISO 14713-1	2017	Zinc coatings - guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part1: General principles of design and corrosion resistance	PSH, PSHA
ISO 21307	2017	Plastics pipes and fittings - Butt fusion jointing procedures for PE piping systems	PSL
SIS 05 59 00	1967	Pictorial surface preparation standards for painting steel surfaces	PSHA
TMH 1	1986	Standard Method of Testing Road Construction Materials	Road Construction

### **C3.3.4: AMENDMENTS TO THE STANDARD PROJECT SPECIFICATIONS**

#### **PREAMBLE**

In certain clauses in the standard specifications, allowance is made for a choice to be specified in the project specifications between alternative materials or methods of construction, and for additional requirements to be specified to suit a particular contract. Details of such alternatives or additional requirements applicable to this contract are contained in this part of the project specifications.

The variations to and additions to the standard specifications are included under section defining the Amended Specifications and are prefixed "P", followed by the applicable clause reference. The clauses and payment items dealt with in this part of the project specifications are numbered such that each item referred to in the standard specification is clearly reflected. The prefix "PSA" indicates an amendment to SABS 1200A, "PSC" to SABS 1200C, etc. The numbers following these prefixes are the relevant Clause numbers in SABS 1200.

Any reference made in this document to "The Engineer" shall be read to mean "The Employer's Agent" as per the definition in the Contract.

Amendments as detailed, take precedence over the Standard Specification.

For the construction management requirements of works contracts, SANS 1921, volumes 1 to 6 are applicable. Although not bound in, nor issued with this document, the following volumes of the SANS 1921 standard specification shall form part of this Contract and are amended below:

Part 1 General engineering and construction works

Part 2 Accommodation of traffic on public roads occupied by the contractor

Part 6 HIV Aids awareness

In the event of any discrepancy between the Project Specifications and a part or parts of the SABS 1200 Standard Specifications or any other Standard Specification, the Schedule of Quantities or the Drawings, the Project Specifications shall take precedence and shall govern.

It is required that, where work to be executed, or items/materials to be supplied and incorporated into the Works are not specified, that such work and or supply items comply with the requirements of a relevant SANS specification. In some instances, a relevant international specification is required to be adhered to

**PSA GENERAL (SABS 1200 A – 1986)****PSA 2.3 DEFINITIONS**

Replace the Sub-Clause:

**PSA 2.3 a) General**

Add the following definitions:

"General Conditions: The GCC 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."

**PSA 2.3 c) 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 of 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 3 MATERIALS****PSA 3.1 QUALITY**

Add to the Sub-Clause:

Materials specified as being to the approval of a Standard Bureau shall bear the official mark of the appropriate standard.

**PSA 3.3 STORAGE OF MATERIALS (NEW SUB-CLAUSE)**

Add new Sub-clause:

The Contractor must make provision at his own expense for the proper storage of all materials in accordance with the manufacturer's recommendations. All cement must be stored in a rain proof and ventilated store and every precaution must be taken to keep it dry. Any bags of cement that show any degree of hydration or setting shall be removed from the site and replaced at the Contractor's expense. Valves need to be stored on hard surfaced areas, well off the surfaced area on pallets or similar, not in direct sun light.

**PSA 3.4 ORDERING OF MATERIALS (NEW SUB-CLAUSE)**

Add new Sub-Clause:

The quantities set out in the Schedule of Quantities have been carefully determined from calculations based on data available at the time and should therefore be considered to be only approximate quantities. The liability shall rest entirely and solely with the Contractor to determine before ordering, the required types and quantities of the various materials required for the completion of the Works in accordance with the Specifications and the Drawings issued to the Contractor for construction purposes. Any reliance placed by the Contractor on the estimated quantities stated in the Schedule of Quantities will be a Contractor's risk.

**PSA 4 PLANT - CONDITION OF PLANT AND MACHINERY (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Any plant and machinery utilized on this Contract shall be in a 100% serviceable and roadworthy condition and shall be well maintained at all times. No plant and machinery shall be allowed to operate if it emits excessive noise, is smoking or is dripping oil. The Engineer's instruction in this regard will be final.

No plant and machinery will be allowed to undergo scheduled services on site or at construction site offices. All scheduled services will be undertaken at the Contractor's workshops, away from the construction site. These workshops shall be operated in a legal manner whereby all Environmental and other applicable laws shall be upheld. No fuel, oil or grease shall be allowed to drain into soak pits or the storm water system without the required grease traps.

Refueling of plant and machinery on site shall take place in such a manner that no fuel is spilt at any stage of the operation.

The Contractor shall only utilize "self greasing" plant and equipment on site to ensure that no need exists to do regular greasing maintenance to plant and machinery on site.

Any unplanned spillage of fuels, grease and/or oil shall be attended to immediately in an appropriate manner.

The requirements of the EMP shall be adhered to at all times during construction.

**PSA 4.2 CONTRACTOR'S OFFICES, STORES AND SERVICES**

Delete the first sentence and add the following:

Neither housing nor shelters are to be made available for the Contractor's Employees on site, and the Contractor shall make his own arrangements if need be to transport the staff to and from site on a daily basis.

Refer to the requirements of the form of contract in this regard.

**PSA 5 CONSTRUCTION****PSA 5.1 SURVEY**

Add the following:

The Contractor must note that a limited amount of survey control has been provided. The Contractor will be required to verify the accuracy of such and shall be held responsible for any errors in the setting out of the works which may arise from the usage of this survey control.

**PSA 5.1.1      Setting out of the Works**

Add to Sub-Clause:

Prior to the commencement of any setting out the Contractor shall be responsible for verifying the correctness of the basic survey control points.

After clearing the site and before commencing any excavation work, the Contractor shall undertake a tachy survey with readings taken at a maximum grid spacing of 5 x 5 metres and shall include all feature lines.

The survey data must be in the format specified in the project specification and must be handed to the Engineer at least 3 working days before the commencement of excavation or the construction of fill.

Monthly claim statements must be accompanied by detailed tachy survey data substantiating volume calculations.

**PSA 5.1.2      Preservation and Replacement of Beacons and Pegs Subject to Land Survey Act**

Add to the Sub-Clause:

All survey reference marks that have been placed in the ground shall be clearly marked and protected by the erection of three fencing standards placed in a triangular formation around the reference peg.

**PSA 5.9          COMPLETION OF WORKS (NEW SUB-CLAUSE)**

Add new Sub-clause:

Upon completion of the Works, the Contractor shall restore and rehabilitate the site as required in terms of the Environmental Management Plan.

**PSA 6            TOLERANCES****PSA 6.2        DEGREES OF ACCURACY**

Add to Sub-clause:

Degree of Accuracy II shall be applicable to the whole of the works but PSG 6 of SABS 1200G – 1982 shall also be applicable and in instances where PSG 6 has a more stringent requirement, then PSG 6 shall apply.

**PSA 7            TESTING****PSA 7.1        PRINCIPLES****PSA 7.1.1      Checking**

Add to Sub-Clause:

The Contractor shall provide the Employer's Representative with a minimum of 24 hours notice when a section of the Works is available for acceptance control testing and shall allow a further full working day for the processing of results.

**PSA 7.2      APPROVED LABORATORIES**

Add to Sub-Clause:

Materials testing may either be carried out in an approved commercial laboratory or in a dedicated site laboratory with sufficient suitable equipment to carry out all routine tests required by the Specifications and for carrying out any other tests which he may deem necessary for the proper quality control of the Works. SANAS registered laboratories are to be used.

**PSA 7.3      METHODS OF TEST**

Add to Sub-Clause:

Density control testing (Method A10(b) of TMH1) shall be carried out using an approved "nuclear" density testing machine (Troxler or similar approved). Density measurement shall be determined using Method C (Direct Transmission) for all layers including the crushed stone base. To this end, the Contractor shall use suitable equipment as necessary for the making of the hole for the probe of the nuclear device, without causing undue damage or stress to the surrounding layer. Method A - Flush Backscatter shall not be used. The Contractor shall also provide a suitably qualified materials tester who will be responsible for taking all samples, density control testing etc. required for his Process Control. The Contractor is responsible for establishment of MODS for excavated material to be re used and stockpile control shall be such that specific material used at any specific location, can be traced back to origin and MOD determined.

**PSA 7.5      SITE CONTROL AND ACCEPTANCE TESTING**

Add new Sub-clause:

The onus rests on the Contractor to produce work which conforms in quality and accuracy of detail to the requirements of the specification and drawings, and the Contractor must, at his own expense, institute a quality control system and provide the necessary competent staff and equipment to ensure adequate supervision and positive control of the Works at all times.

The cost of process control, including testing, so carried out by the Contractor, shall be deemed to be included in the rates tendered for the relevant items of work. The results of the above test must be presented to the Employer's Representative upon request.

The Employer's Representative may at his discretion order acceptance testing by an independent approved laboratory. Where the tests reveal that the material used in the construction or the tolerance standard achieved does not comply with the applicable requirements of the specification, the costs of these check tests will be borne by the Contractor.

**PSA 8      MEASUREMENT AND PAYMENT****PSA 8.2.1      Fixed Charge and Value Related Items**

Delete Sub-Clause and replace with:

Each item should be priced separately and, subject to the Engineer certifying in terms of the GCC Contract that the work has been done, payment will be made as follows:

- 1) The total amount due when the certified value fixed charge items in this section is less than 5% of the net contract price;

When the certified value of fixed charge items in this section is greater than 5% of the net contract price, payment will be limited to 5% of the net contract price. The

remainder will be paid when the value of the work done under the contract, excluding the value of fixed charge items in this section, is greater than 50% of the net contract price, excluding the value of fixed charge items in this section.

### **PSA 8.2.2 Time Related Items**

Delete lines 3 and 4 and replace with:

....incremental amounts (calculated by the division of the remainder of the tendered sum by the number of remaining months of the duration of construction as assessed by the Engineer) will be...

Add to the Sub-Clause:

Notwithstanding the provisions of Sub-Clause PSA 8.2.2, an approved extension of time will not qualify the Contractor to receive any payment for that portion of fixed charge and value-related items which have become regarded as "time-related" items in terms of PSA 8.2.1 above.

### **PSA 8.3.5 De-Establishment of Site**

Add new Sub Clause:

The unit of measurement shall be Number Of (No.).

The Tendered rate shall cover the cost of each site de-establishment when instructed by the Employer's Representative, this will include the de-establishment of all facilities on site and plant if necessary and making the site safe.

### **PSA 8.3.6 Re-Establishment on Site**

Add new Sub Clause:

The unit of measurement shall be Number Of (No.).

The Tendered rate shall cover the cost of each site re-establishment when instructed by the Employers Representative, this will include the re-establishment of all facilities as per PS 3.6 and SANS 1200 A 8.3.2.

### **PSA 8.4.6 Acceptance Testing**

Add new Sub-Clause:

A commercial laboratory will carry out acceptance testing as and when directed by the Employer's Representative. (SANAS Registered)

The Contractor will be required to pay the laboratory in full for any testing carried out as directed by the Employer's Representative. These monies will be reimbursed to the Contractor.

The Contractor will still be required to carry out his own process control testing.

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**PSA 8.7 DAYWORKS**

Add to Sub-Clause:

No work shall be measured on a daywork basis unless the Contractor has been instructed to do so by the Employer's Representative in writing. All work carried out on dayworks shall be recorded in detail on a daily basis. Dayworks plant and labour returns shall be submitted to the Employer's Representative daily for consideration and approval.

No transport costs to and from the site will be paid for plant removed from site at the Contractor's request or where such plant is listed in the Schedule of Plant and Equipment as available for this Contract. .

**PSA 8.8 TEMPORARY WORKS – DEALING WITH WATER ON WORKS**

Add new Sub-Clause:

The tendered sum(s) and rates shall cover the cost of providing, operating and maintaining the necessary equipment and other temporary works for dealing with groundwater in trenches and excavations.

**PSAB ENGINEER'S OFFICE (SABS 1200AB)**

Amend clause to read "Employers Representatives Office".

**PSAB 3 MATERIALS****PSAB 3.1 NAME BOARDS**

Replace Clause 3.1 with:

A notice board as detailed in Part C4: Site Information is to be erected to the satisfaction of the Employer's Representative.

**PSAB 3.2 OFFICE BUILDINGS**

Add the following:

The Employers Agent office shall have a floor area of at least 18m<sup>2</sup>. In addition, the offices shall be fitted with:

- Correctly sized air conditioning units.
- Refrigerator of 100l capacity
- 4 No 15 Amp earther power plug points reticulated within the offices for computer powering and other office equipment.
- An approved stand and holders for 20 vertically hung A0 drawings.
- An approved colour printer and scanner to print and scan A3 documents adequate printer cartridges shall be provided throughout the contract duration
- Provide, install, and maintain a water dispenser and ensure the continuous supply of clean, potable water for the duration of the contract.
- A lockable cabinet
- 3 desks, 3 chairs and shelves.
- A drawing table shall be supplied to each office, capable of spreading an A0 drawing satisfactorily.
- 4 carports shall be provided for exclusive use of the Employers Agent and the Employer. The carports shall have suitable roof cladding and be covered on 3 sides

The offices must comply with the requirements of Clause 3.2 of SANS 1200AB and must be located in a shady area or be protected from the sun by shade cloth suspended over its roof. In addition to the above comfortable, air-conditioned accommodation shall be made available for holding regular site meetings. This accommodation must comfortably cater for up to 15 persons seated around a table. The Contractor is to ensure that the boardroom allows for the following:

- Correctly sized air conditioning units.
- 8 No 15 Amp earther power plug points reticulated within the offices for computer powering and other equipment.
- Projector and screen.
- Tables, chairs and shelves.

**PSAB 3.3 TEMPORARY OFFICE BUILDINGS FOR THE EMPLOYERS STAFF**

Add a new clause as follows:

The Employers Staff temporary office shall include the following for the entire contract period:

- Offices to comfortable house 5 individuals.
- Correctly sized air conditioning units.
- 1 x Refrigerators of 100l capacity
- 6 No 15 Amp earther power plug points reticulated within the offices for computer powering and other office equipment.
- An approved colour printer and scanner to print and scan A3 documents adequate printer cartridges shall be provided throughout the contract duration
- Provide, install, and maintain a water dispenser and ensure the continuous supply of clean, potable water for the duration of the contract.
- 2 x lockable cabinets
- Desks, chairs and shelves.

The offices must comply with the requirements of Clause 3.2 of SANS 1200AB and must be located in a shady area or be protected from the sun by shade cloth suspended over its roof.

#### **PSAB 4.1 TELEPHONE**

Add to sub clause:

A wireless internet service is to be provided at the site offices with minimum **50GB** data access per month for Employer's Agent and Employer's use.

#### **PSAB 5 CONSTRUCTION**

##### **PSAB 5.5 SURVEY ASSISTANTS**

Delete the first sentence and substitute the following:

Survey assistants are to be made available to the Engineer when required.

##### **PSAB 5.6 SURVEY EQUIPMENT (NEW SUB-CLAUSE)**

Add new Sub-Clause:

The Contractor shall provide the following survey equipment on the site as and when required by the Engineer Assistants:

- No. Automatic Level(Leica 728) with aluminium tripod (Leica GST05L)
- No. Leica CLR102 Telescopic 5M , 4 section Levelling staff
- No. Staff Angle Bubble
- No. 2KG Hammer
- No. Plumb bob
- 1No. Metal Change points
- 1No. 30m Reinforced Glass Fibre Tape
- 1 No. Leica D3 Laser Distance meter (Instead of a 5 M retractable steel tape)
- 1 No. Elcometer 456 Coating Thickness Gauge

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**PSC SITE CLEARANCE (SABS 1200 C – 1980 AS AMENDED 1982)****PSC 3 MATERIALS****PSC 3.1 DISPOSAL OF MATERIALS**

Add the following:

The free haul distance for this contract is unlimited.

Contractors are to note that no overhaul will be paid. Material obtained from clearing must be disposed of offsite by the Contractor at his expense. The Contractor will be held responsible for observing the by-laws and regulations of the relevant local authority. Burning of combustible material shall not be allowed. The site is situated adjacent to existing buildings and dust control is to be maintained at all times

The requirements of the EMP, if applicable, are to be met at all times.

**PSC 5 CONSTRUCTION****PSC 5.1 AREAS TO BE CLEARED AND GRUBBED**

Add to Sub-Clause:

The Employer wishes to control and limit erosion as well as preserve the existing natural bush and trees as far as possible. The areas to be cleared must be kept to a minimum but be such as not to affect the quality of the work and hamper the efficient execution of the Contract. The Contractor shall also take all necessary precautions to protect the existing fauna and flora during clearing and construction operations.

The Employer's Representative reserves the right to order manual clearing and grubbing should the conditions warrant this.

**PSC 5.3 CLEARING**

Add to the Sub-Clause:

Where pipes are to be laid the Contractor shall be allowed to clear and grub the construction corridor for the maximum width of the allowed working space corridor width as specified. No construction activities may be undertaken outside the construction corridor demarcated by the temporary fencing to be erected.

All trees with a girth more than 250 mm or a height of more than 2,5m within this strip, shall be protected and may only be trimmed or removed after a written order by the Employer's Representative.

No site clearance activities shall commence before the issuing of an "Access Certificate" by the Employer's Representative. Such access certificate" is not the same as "provision of access" as required by the Conditions of Contract. It merely indicates that the Engineer has verified that preconditions for work in the proposed work area may commence as preconditions have been met.

The tendered rates for site clearance shall be deemed to include for the removal of waste from site and the disposal thereof.

With reference to SABS 1200 C clauses 5.3 and 5.4 and 8.2.1, payment will be made for clearing and grubbing only where required and to an extent that will enable excavation of trenches to proceed and not necessarily along the entire length of the pipeline. Disturbance

of vegetation and roots should as far as possible be confined to the width of the trench, except that vegetation may be cut back to provide reasonable access and working space, without destroying the potential for re-growth.

#### **PSC 5.4 GRUBBING**

In the fourth line delete "200mm" and substitute 300mm.

#### **PSC 5.6 CONSERVATION OF TOPSOIL**

Add to the Sub-Clause:

All topsoil shall be conserved for later use by stockpiling clear of the working area.

#### **PSC 8 MEASUREMENT AND PAYMENT**

##### **PSC 8.2.1 Clear And Grub**

Replace the first line with the following:

The area designated by the Employer's Representative to be cleared and grubbed will be measured in square metre to the nearest square metre

The unit of measurement shall be square metre (m<sup>2</sup>).

##### **PSC 8.2.4 Re-clear surfaces (only on instructions from the Engineer)**

Add to the Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

##### **PSC 8.2.5 Take Down Existing Fences**

Add to the Sub-Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include for storing and reinstatement of the fence as directed by Employer's Representative on site.

##### **PSC 8.2.7 Dismantle and Remove Existing Services**

Add to the Sub-Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include for stockpiling of dismantled services for returning to the Employers depots, where required.

The rate for removal of Asbestos Cement pipelines/items shall cover the cost of the cutting of the existing pipe, dismantling, lifting and stockpiling in accordance to Construction Regulations, 2014, Asbestos Regulations, 2001 and Environmental Management Plan, PEM 5.11 Hazardous Waste.

##### **PSC 8.2.8 Demolish and Remove Existing Structures/Buildings**

Add to the Sub-Clause:

The tendered rate shall include transporting rubble to an approved spoil site.

The unit of measurement shall be number (No.)

#### **PSC 8.2.10 Remove Topsoil to Stockpile**

Add to the Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The tendered rate shall include full compensation for removing topsoil to a depth of 150mm for the maximum width of the allowed working space corridor width or platform working area and for loading and transporting the material to and from a stockpile, including maintaining, in the vicinity of the site of works. No indiscriminate clearing and spoiling shall be allowed.

Where topsoil conditions allow for removal more than 150mm deep, the Engineer may instruct accordingly up to a depth of 300mm.

#### **PSC 8.2.11 Saw Cutting Of Existing Asphalt Surface (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measure shall be the linear metre of the asphalt cut according to the plans or as instructed by the Employer's Representative. The rate shall include for the supply of an approved asphalt saw cutting machine and all other necessary equipment for saw cutting of asphalt, according to the specification which calls for a double cut on each side of the excavation if required.

#### **PSC 8.2.12 Saw Cutting Of Existing Concrete (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measure shall be the linear metre of the concrete cut according to the plans or as instructed by the Employer's Representative. The rate shall include for the supply of an approved asphalt saw cutting machine and all other necessary equipment for saw cutting of concrete, according to the specification which calls for a single cut.

#### **PSC 8.2.13 Remove Existing Road Asphalt Surfacing To Spoil (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all asphalt surfacing as instructed by the Employer's Representative. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

#### **PSC 8.2.14 Remove Existing Gravel Layerworks To Spoil (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The rate shall include for the selective removal of existing gravel layerworks to the required depth as instructed by the Employer's Representative, loading and transporting to spoil as per Clause PSC 3.1: Disposal of Material. The rate shall take into account that this work will have to be carried out in more than one operation depending on the construction programme and traffic accommodation.

#### **PSC 8.2.15 Remove Existing Concrete Surfacing To Spoil (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all concrete surfacing as instructed by Employer's Representative. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

#### **PSC 8.2.16 Remove Along Edges Of Road And Footway (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre length (m).

The rate shall include the removal of the concrete kerbing and associated concrete backing, loading, transporting and disposal to spoil sites selected by the Contractor and approved by the Employer's Representative.

#### **PSC 8.2.17 Dismantle, Storing And Re-Erection Of Road Signs**

Add new Sub-Clause:

The unit of measurement shall be number (No).

Exceeding but not exceeding surface area of: 0 - 2,0m<sup>2</sup>

The unit of measure shall be the number of road signs dismantled, stored and re-erected as instructed by the Employer's Representative.

The rate shall include the cost of dismantling and re-erection of all components of the road sign, the transporting to and from storage, all costs associated with the storage of the road signs, all labour costs involved in the process of dismantling and re-erection and the backfilling, shaping and trimming of any sign post holes.

#### **PSC 8.2.18 Remove Existing Concrete Kerbing & Channeling**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all concrete kerbing and channelling as instructed by Employer's Representative. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

#### **PSC 8.2.19 REMOVAL AND DISPOSAL OF EFFLUENT**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The rate shall cover the cost of removal activities (draining pond), all necessary equipment, loading, transporting of effluent removed from the pond/drying bed. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation. The rate shall also take into account all treatment processes required to ensure the effluent can be safely disposed.

#### **PSC 8.2.20 REMOVAL AND DISPOSAL OF SLUDGE/RESIDUE**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The rate shall cover the cost of removal activities (residue/sludge), all necessary equipment, loading, transporting from the tank. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation. The rate shall also take into account all treatment processes required to ensure the sludge can be safely disposed.

#### **PSC 8.2.21 Clear debris, material, vegetation, residue**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The area designated by the Employer's Representative to be cleared of debris, material, vegetation, residue will be measured in cubic metres. The rate shall include of disposal of material safely and in accordance with applicable standards for hazardous materials disposal.

#### **PSC 8.2.22 Reclear surfaces (only on instructions from the Engineer)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The area designated by the Employer's Representative to be cleared of debris, material, vegetation, residue will be measured in cubic metres. The rate shall include of disposal of material safely and in accordance with applicable standards for hazardous materials disposal.

## **PSD            EARTHWORKS (SABS 1200 D – 1988 AS AMENDED 1990)**

### **PSD 2           INTERPRETATIONS**

#### **PSD 2.1.2      Supporting Specifications**

Delete Sub-Clause and replace with:

Any of the other SABS 1200 Specifications (latest editions) may form part of the Contract Documents.

#### **PSD 2.3        DEFINITIONS**

Delete the sentence under **Borrow** and replace with:

**Borrow:** Material, other than material obtained from excavations required for the Works, obtained from sources such as borrow pits or the authorised widening of excavations. 'Borrow' shall have a corresponding meaning.

Delete the sentence under **Restricted Excavation** and replace with:

**Restricted excavation** - An excavation so restricted in area or width as to preclude removal of material by excavating machinery used for bulk excavation measured in terms of Sub-Clause 8.3.2. Restricted excavation may be carried out by smaller machinery or by hand, as selected by the Contractor. The extent of restricted excavation shall be as scheduled and/or shown on the drawings. All other excavation shall be regarded as bulk excavation.

Delete the sentence under **Specified Density** and replace with:

**Specified density:** The specified dry density expressed as a percentage of modified AASHTO dry density.

Delete the sentence under **Stockpile** and replace with:

**Stockpile** (Verb): The process of selecting and as may be necessary, loading, transporting and offloading material in a designated area for later use and a specific purpose.

Add the following definitions:

**Fill:** An embankment or terrace constructed from material obtained from excavations or borrow. In roads it includes the earthworks up to the underside of the selected subgrade level.

**Fill (material):** Material used for the construction of an embankment or terrace.

**Roadbed:** The natural in situ material on which the fill, or in the absence of fill, any pavement layers, are to be constructed.

### **PSD 3           MATERIALS**

#### **PSD 3.1        CLASSIFICATION**

Delete Clause 3.1 and replace with the following:

Classification of Excavation

For the purpose of measurement and payment excavated material shall be classified under the following three headings:

### Rock

Rock shall be held to be undecomposed boulders exceeding 0,2m<sup>3</sup> in volume and solid rock occurring in bulk, banks or ledges, the excavation of which would normally necessitate the use of explosives and shall have a total rating in excess of 75, as defined in the following Table. In addition, when tested with Type L Schmidt hammer, the rock shall have a rebound value above 30, when tested vertically downwards.

### Hard Material

Hard material shall be held to be the material other than rock which needs to be loosened by pneumatic, hydraulic or mechanical breakers prior to being excavated and shall have a total rating between 25-75 as defined in the following Table. In addition, when tested with a Type L Schmidt hammer, it shall have a rebound value in the range 5-30 when tested vertically downwards.

### Soft Material

Soft material will be held to be material not falling into the categories of rock and hard material such as gravel, earth, sand, silt, clay and completely weathered rock and shall have a total rating less the 25 as defined in the following Table. In addition, when tested with a Type L Schmidt hammer, it shall have a rebound value less than 5 when tested vertically downwards.

**Table 1: Rock Classification**

CLASS	I	II	I	IV	V
DESCRIPTION	Very Good Rock	Good Rock	Fair Rock	Poor Rock	Very Poor Rock
Seismic Velocity (m/s)	>>2 150	2 150-1 850	1 850-1 500	1 500-1 200	1 200-450
Rating	26	24	20	12	5
Rock Hardness Rating	Extremely Hard 10	Very hard 5	Hard 2	Soft 1	Very soft 0
Rock Weathering Rating	Unweathered 9	Slightly Weathered 7	Weathered 5	Highly Weathered 3	Completely Weathered 1
Joint Spacing (mm)	>>3 000	3 000-1 000	1 000-300	300-50	<<50
Rating	30	25	20	10	5
Joint Continuity Rating	Non Continuous 5	Slightly Continuous 5	Continuous -no gouge 3	Continuous Some gouge 0	Continuous With gouge 0
Joint Gouge Rating	No Separation 5	Slight Separation 5	Separation <<1mm 4	Gouge <<5mm 3	Gouge >>5mm 1
Strike and Dip Orientation Rating	Very Unfavourable 15	Unfavourable 13	Slight Unfavourable 10	Favourable 5	Very Favourable 3
Total Rating	100-90	90-70	70-50	50-25	<25

**PSD 3.1.3 General**

Add new Sub-Clause:

The method of excavation shall be at the discretion of the Contractor provided that the work complies with the specification and the following requirements:

Excavations shall be confined within the limits defined by the drawings or as instructed by the Employer's Representative.

Surfaces in excavations shall at all times be formed to shed stormwater and groundwater without ponding.

where excavation is accomplished by blasting and the material is required for fill, sufficient fragmentation shall be attained to allow the material to be used as fill; and

excavated faces in abandoned borrow shall be formed to stable slopes.

Since borrow sites are usually required for future development, the Contractor shall not excavate haphazardly and strict level control shall be maintained at all times. Site design levels will be supplied to the Contractor and he shall ensure that these levels are strictly adhered to. Where topsoil is to be removed prior to excavation this will be considered a separate operation and will be measured as such.

The Contractor or his representative shall jointly with the Employer's Representative keep a record of the depths, dimensions and classification of excavation as defined in clause PSD 3.1.

**PSD 3.1.4 Overbreak**

Add new Sub-Clause:

Excavation carried out in excess of the specified depth, unless authorised by the Engineer, shall be made up with concrete class 15/26 or other approved material, as directed by the Engineer, at the Contractor's expense.

Where the sides of foundations are specified on the drawings as being cast against in-situ ground, the excavations shall be carried out to the neat dimensions of the base and any overbreak shall be backfilled with the same class of concrete as that in the base or with mass concrete fill as specified or directed by the Engineer.

Where the bottoms or sides of excavations, against which concrete is to be cast, are softened due to rain or other causes the softened material shall be removed and replaced by concrete or other approved material as directed by the Engineer at the Contractor's expense provided always that the material forming the sides of the excavation is initially capable of standing unsupported at the required slope.

**PSD 3.2 CLASSIFICATION FOR PLACING PURPOSES****PSD 3.2.1 Material Suitable For Embankments And Terraces**

Delete the Sub-clause and replace with **SABS 1200DA 3.2.1, GENERAL**, with the following modifications:

In the first sentence delete "150mm" and substitute with "100mm"

Add to Sub-clause:

The material for the embankments shall be compacted to 95% modified AASHTO density.

**PSD 3.2.2      Material Suitable For Replacing Overbreak In Excavation For Foundations**

Delete Sub-clause and replace with:

Excavation carried out in excess of the specified depth, unless shown on the drawings or authorised by the Employer's Representative, shall be made up with concrete class 15/19 or other approved material, as directed by the Employer's Representative, at the Contractor's expense.

Where the sides of foundations are specified on the drawings as being cast against in-situ ground, the excavations shall be carried out to the neat dimensions of the base and any overbreak shall be backfilled with the same class of concrete as that in the base or with mass concrete fill as specified or directed by the Employer's Representative.

Where the bottoms or sides of excavations, against which concrete is to be cast, are softened due to rain or other causes. The softened material shall be removed and replaced by concrete or other approved material as directed by the Employer's Representative at the Contractor's expense provided always that the material forming the sides of the excavation is initially capable of standing unsupported at the required slope.

**PSD 3.3      SELECTION****PSD 3.3.1      General**

Delete Sub-Clause and replace with:

All topsoil requires to be conserved for this Contract. Topsoil shall be preserved by stockpiling for later use and be re-spread over the area where removal took place. The requirements of the EMP are to be met at all times.

**PSD 3.3.3      Stockpile Sites**

Add new Sub-Clause:

Stockpile sites shall be prepared by clearing and light grading. The contractor shall ensure that windblown sand will be kept to a minimum so as not to constitute a public nuisance.

**PSD 3.3.4      Selection In Borrow Pits And Excavations**

Add new Sub-Clause:

The approval of a borrow area for a certain purpose does not necessarily mean that all material within that area is suitable for the specified purpose. What it does mean, is that the borrow area contains some suitable material. The onus is on the Contractor to ensure that only material that is deemed suitable, is removed and used for the specified purpose. Where the Contractor is required to select material from excavations for a specific purpose, the above provisions relating to borrow areas shall apply mutatis mutandis to excavations. The Contractor shall not waste or contaminate material that has been selected for a specific purpose.

**PSD 4 PLANT****PSD 4.1 GENERAL**

Replace clause 4.1. with the following:

In general, the Contractor may use whatever plant he considers appropriate to construct the work to required specification.

In the case of backfill against structures, however, no earthmoving equipment with a mass exceeding 1 000 kg shall be used within a zone of restricted placing, normally within 2,5m of any concrete face, unless otherwise specified.

**PSD 5 CONSTRUCTION****PSD 5.1 PRECAUTIONS****PSD 5.1.1.1 Barricading and Lighting**

Change heading to read: **BARRICADING/FENCING, LIGHTING, SIGNS AND ACCESS**

Delete Sub-Clause and replace with:

Without limiting any obligation which the Contractor may have in terms of any Act, Ordinance or other legislation, the Contractor shall ensure that all excavations which are accessible to the public or which are adjacent to a public road or thoroughfare, or by which the safety of persons may be endangered, are protected as set out in Clause 13 of the General Safety Regulations of the Occupational Health and Safety Act, 1993. The Contractor shall employ watchmen who are to ensure that barricades, barriers and lights are effective at all times. The Contractor shall, for this purpose, have at its disposal a 24 hour response team that can react to public complaints in this regard or to calls from the watchmen who are employed to ensure effective barricades, barriers and lights at all times.

Barricades are grouped into different categories:

**1.a Barrier Fences without electrical fence –**

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres. Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities are prevalent. Barrier Fences shall be erected alongside the working corridor on both sides for the full length of the working front as instructed by the Employer's Representative.

**1b. Barrier Fences with electrical fence –**

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres with 20 strand electrical fence to the outside of the property. Also, facing the Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities are prevalent. Barrier Fences shall be erected alongside the working corridor on both sides for the full length of the working front as instructed by the Employer's Representative.

**2.a. Rigid Barricades for noise reduction 1.8m high –**

Rigid Barricades for noise reduction shall consist of 1.8m high barricading constructed out of smooth solid material, which will bounce off noise waves as well as disabling seeing into the area being barricaded. The Barricade structure shall be rigidly fixed to the ground to prevent access and it being blown over by wind. Rigid Barricades for noise reduction shall typically be required in areas where construction noise poses an annoyance in built up areas. Rigid Barricades for noise reduction shall be erected as instructed by the Employer's Representative.

**2.b. Rigid Barricades for noise reduction 3m high –**

Rigid Barricades for noise reduction shall consist of 3m high barricading constructed out of smooth solid material, which will bounce off noise waves as well as disabling seeing into the area being barricaded. The Barricade structure shall be rigidly fixed to the ground to prevent access and it being blown over by wind. Rigid Barricades for noise reduction shall typically be required in areas where construction noise poses an annoyance in built up areas. Rigid Barricades for noise reduction shall be erected as instructed by the Employer's Representative.

**3. Rigid Barricades for preventing access –**

Rigid Barricades for preventing access, shall be of interlocking modular type, 1.8m high, with a barricade face of at least a Bonox type or similar approved fence type. The barricade shall be capable of being secured to the ground to prevent it from falling over, being bumped over or blown over by the wind. The bottom section of the fence type shall be such that animals cannot get through. Red and white danger tape shall be woven through the fence in order to increase visibility and the tape shall be secured in order to prevent loose ends from flapping in the wind or lying on the ground. Rigid Barricades for preventing access shall typically be required around excavations in road reserves where there is no danger of passing traffic driving into such excavations. Rigid Barricades for preventing access shall be erected as instructed by the Employer's Representative.

**4. Rigid Barricades for preventing access and visibility –**

Rigid Barricades for preventing access and visibility shall be of the same construction as the Rigid Barricades for preventing access, with the provision that 80% density black shade cloth which is well secured to the fence, shall block out visibility into work areas where same is required. Rigid Barricades for preventing access and visibility shall be erected as instructed by the Employer's Representative.

**5. Barricades of Armco type or similar approved, fitted into Tarmac surfaces –**

This type of barricade shall consist of the Armco type barrier, fitted to 200mm wooden posts at 3000mm centres, planted 800mm deep into the road surface. The holes for the wooden posts shall be augered in order to limit overbreak. Compaction of the posts shall be with a material similar to the specified pipe bedding which can be hydraulically compacted to 100% MOD AASHTO. Upon removal of the wooden posts, the post holes shall be backfilled with a material similar to the specified pipe bedding which can be hydraulically compacted to 100% MOD AASHTO and compaction shall be 100% MOD AASHTO. The final 300mm layer of backfill, onto which the wearing course will be laid, shall consist of G2 material compacted to 97% MOD AASHTO. Barricades of Armco type or similar approved, fitted into Tarmac surfaces shall be erected as instructed by the Employer's Representative.

**6. New Jersey type barriers or similar approved –**

This type of barrier shall be typical of the standard New Jersey concrete barrier or similar approved and shall be erected as instructed by the Employer's Representative. The

barriers shall be adequate for containment level H2 as specified in SANS 51317 -2:2009 Part 2.

## **7. Opaque Screen Barrier Fences –**

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres. The fence shall be fitted with 80% density black shade cloth in order to limit visibility. Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities are prevalent and visibility into the working corridor is to be limited.

No access into any barricaded area shall be allowed to anybody other than construction workers and representatives of the Employer's Representative who have undergone a site induction course. At each barricaded work front, an authorised person, qualified to un-lock the system, or in the case of Barrier Fences or Rigid Barricades for noise reduction, opening a special gate in the fence or barricade, to grant access to staff, shall be deployed. In the cases where different types of barricades are utilised in conjunction with each other, for example a New Jersey barrier on the one side of the excavation and a Rigid Barricade for preventing access on the other, the ends where transition from one to the other takes place, shall be adequately closed off with suitable barrier type as instructed by the Employer's Representatives. The Contractor shall ensure that access at ends where vehicles have to enter and exit, are controlled.

Access ramps for vehicles and/or pedestrians shall be provided along the route of the work for the purpose of providing access. Suitable barricading and hand rails shall be provided for these access ramps. Where construction is in, or across, public roads; barricades or barriers and temporary road signs shall be erected. All such signs and positioning thereof shall comply with the requirements of the local roads authority.

### **General**

The tendered rates for barricading shall include the supply, erection, maintenance and relocation of barricading and barriers as required by the Employer's Representative. The requirement to utilise bollards and or traffic cones or any other equipment in order to manage traffic flow and movements, which are not measured as barricades, shall be priced for under the relevant activities and all rates tendered for these activities shall be deemed to include for the use of same.

Where access by property owners is required, through barricaded areas, such access shall be arranged through setting up barricading in such a manner that access to property is possible without access to work areas which requires barricading. All tendered rates for barricading shall be deemed to include for such protected access by property owners.

Although a range of barricades are defined above, the Contract might only require specific types for which items have been allowed for in the Bill of Quantities.

## **PSD 5.1.1 Safety**

Add to Sub-clause:

All activities shall be carried out in accordance with the requirements of the relevant clause of the Occupational Health and Safety Act (Act 85 of 1993).

## **PSD 5.1.1.2 Safeguarding of Excavations**

Delete the first three lines and substitute the following:

The Contractor or his Agent or Representative appointed in writing shall be deemed to be a person who is competent to pronounce on the safety of all bracing and shoring as set out in the Occupational Health and Safety Act (Act 85 of 1993).

Add to the Sub-Clause:

The Contractor shall provide additional lateral support for all buildings, structures and services affected by his operations as required and deemed to be applicable.

The relevant sums tendered for trenching in the Bill of Quantities shall cover the cost of providing, installing, maintaining and removing lateral support that is adequate for preserving the stability of the existing fences, walls, buildings, structures and services and shall include for productivity rates applicable to a construction process including the deployment of mechanisms require to safeguard excavations.

In sub clause a) delete the words "Machinery and Occupational Safety Act" in the third and fourth lines and substitute "regulations to the Occupational Health and Safety Act, 1993."

### **PSD 5.1.1.3 Explosives**

Add to Sub-Clause:

Blasting shall not be carried out without the prior consent of the Employer's Representative. This consent will not be given where in the opinion of the Employer's Representative, blasting may give rise to unnecessary risk or damage to surrounding property when other means of excavation are available to the Contractor. Where consent to blasting is given, such consent shall in no way relieve the Contractor of any of his liabilities under the contract.

The Employer's Representative shall be notified at least 72 hours beforehand of the Contractor's intention to use explosives on site.

It shall be incumbent on the Contractor to make himself aware of restrictions to blasting imposed by electric transmission or telephonic lines, fuel pipelines, or other similar services.

Where the presence and location of such services are known or are shown on the drawings at tender stage the Contractor must make allowance in his rates and programme for restrictions and delays which may result from the restrictions imposed by the relevant authorities.

### **PSD 5.1.1.4 Use of Explosives**

Add new Sub-Clause:

Generally, the Contractor shall be permitted to use explosives for breaking up rock and hard material during excavations, for demolishing existing structures and for such other purposes where it may normally be required, subject to the following conditions:

The Employer's Representative or Inspector of Explosives shall have the power to prohibit the use of explosives in cases where in his opinion, the risks of injury to persons or damage to property or adjoining structures or services are too high. Such action by the Employer's Representative shall not entitle the Contractor to any additional payment for having to resort to other less economical methods of construction unless otherwise provided in the Special Conditions or Bill of Quantities.

Should blasting be necessary, the Contractor shall take every precaution to protect the Works, persons, animals and property in the vicinity of the site. The Contractor shall be held responsible for any injury or damage caused by any blasting operations and shall make good such damage at his own expense.

The latest requirements of the Explosives Regulations Act (Act 26 of 1956) and the requirements of the Inspector of Explosives shall be complied with. In addition, where applicable, the requirements of Chapter 9 of the Regulations published in terms of the Mines and Works Act (Act 27 of 1956) and the requirements of the Government Mining Engineer shall be complied with. All explosives handling, storage and blasting operations to be in accordance OHS Act, Explosives Regulations, Government Gazette No. 2472

A copy of each blasting permit issued to workmen, and of each permit issued to the Contractor to cover the purchase, storage and transport of explosives, shall be supplied to the Employer's Representative. The Contractor shall grant the Employer's Representative access to all records maintained for the Inspector of Explosives or the Government Mining Engineer, as the case may be.

#### Blasting Near Dwellings/Installations/Services

- i) Before any blasting is undertaken, the Contractor, together with the Employer's Representative, shall examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting and establish and record, together with the owners thereof, the extent of any cracking or damage that may exist before commencement of blasting operations. It is recommended that a detailed photographic record of neighbouring structures be taken before blasting commences. It will be the responsibility of the Contractor to make good at his own expense any further damage to such houses, buildings or structures which is a result of the blasting.
- ii) Where there is reasonable danger of damage (structural, electrical or mechanical) to adjacent reservoirs and associated structures, power and telephone lines, fuel pipelines, or any other property, the Contractor shall suitably adapt his methods of blasting, the size of charges, and use adequate protective measures to ensure that no damage occurs.

The Contractor is to submit to the Employer's Representative for approval a professional report on the proposed method of blasting to be adopted for the works.

During the initial blasting on site the Employer's Representative shall arrange for a survey to be carried out in order to monitor the magnitude of the blast vibrations and to establish the most vibration sensitive point on the perimeter of the site. Should it be required, the Contractor shall modify the adopted method of blasting as instructed by the Employer's Representative.

For every blast carried out on site the Contractor shall provide three vibro recorders and a peak particle velocity meter. Calibration certificates are to be supplied to the Employer's Representative prior to commencing blasting on site. The Employer's Representative shall arrange for random checking of the calibration of such instruments.

The Contractor shall keep full records of every blast on site, e.g. number, depth and size of holes, amount and type of explosive used per hole, number of blasts at any one time, magnitude of recorded vibrations etc., a copy of which is to be forwarded to the Employer's Representative.

All blast surfaces are to be covered with mats and/or a suitable thickness of soft cover material all to the satisfaction of the Employer's Representative.

For every blast carried out on site, the Contractor shall cover the cordtex etc., with soft sandy material to dampen the noise levels of the blast all to the satisfaction of the Employer's Representative.

The maximum allowable peak particle velocity measured at any point 10m from the nearest structure to the blast shall not exceed 25mm/sec. The fact that peak particle velocity has been stated in this clause does not mean that the Contractor should accept this as the minimum requirement at all times. Should circumstances require

a reduced peak particle velocity from that stated above, to ensure a safe environment from blasting, the Contractor shall adjust his blasts according to requirements.

When blasting to specified profiles, the Contractor shall so arrange the holes and charges that the resulting exposed surfaces are as sound as the nature of the material permits. The Contractor shall make good at his own expense any additional excavation necessitated by the shattering of rock in excess of any over break allowance specified in the Special Conditions or any other specification given on a drawing.

The Contractor shall include for all costs in complying with the above requirements/ conditions in the tendered rates for excavation.

Notwithstanding any of the requirements of the Specifications the Contractor will be required to carry out a sufficient number of test blasts (minimum 3), each comprising of a maximum number of 9 holes charged with small charges, in order to ascertain the attenuation affects of the in-situ material and to satisfy both himself and the Employer's Representative that the proposed methods of blasting will not damage any existing services and/or dwellings and structures.

All persons occupying property in the vicinity of a proposed blast shall be informed in writing at least 72 hours before the first blast and shall be informed of the warning procedures to be employed. In addition, before any blasting is carried out, the Contractor shall notify the local Police in writing of proposed operations, the warning procedures to be employed, and the anticipated duration of the blasting operations.

Immediately prior to blasting, all approaches to the area shall be guarded by personnel carrying red warning flags.

#### **PSD 5.1.1.5 Negligence**

Add new Sub-Clause:

The Contractor shall be liable for all damages to property or services caused as a result of blasting.

#### **PSD 5.1.3 Stormwater and Groundwater**

Delete the second sentence and substitute:

Foundation excavations for structures shall be kept free of water at all times until they have been inspected and approved and the concrete substructures, together with their related superstructures, have been completed.

### **PSD 5.2 METHODS AND PROCEDURES**

The plant used for applying the dynamic load, controlling the moisture content and grading or mixing shall be capable of achieving the compaction specified using the materials available for the construction of the Works.

#### **PSD 5.2.1 Site Preparation**

##### **PSD 5.2.1.1 Clearing of and stripping of site**

Delete the last sentence of (b) and substitute:

"Material so removed shall be disposed of by the Contractor to approved sites in terms of the Environmental Management Plan".

**PSD 5.2.1.2 Conservation of Topsoil**

Add to the Sub-Clause:

All topsoil suitable for re-use shall be transported directly to the stockpile area and placed separately from all other materials in order to avoid contamination. All stockpiles are to be managed in terms of acceptable environmental management practises.

**PSD 5.2.2 Excavation****PSD 5.2.2.1 Excavation for General Earthworks and Structures**

Add to the Sub-Clause:

No concrete or other material shall be built or otherwise placed in the foundation pits until they have been cleaned, inspected and passed by the Employer's Representative. The bottom of the excavation must be compacted to at least 95% Mod. AASHTO density provided that the material in itself is capable of being so compacted and the excavation must be kept free of water at all times.

Where the material at the founding level is soft material, or hard material which deteriorates rapidly on exposure, excavation to final level shall not be made until just before the Contractor is ready to place the blinding layer.

Immediately after the material at founding level has been approved and before it is built upon, levels shall be taken and compared by the representatives of the Contractor and the Employer's Representative. Any disagreement is to be checked immediately while it is still possible to do so.

Excavated and stockpiled material shall be deposited so as not to endanger the uncompleted structure either by direct pressure or indirectly by overloading the banks adjacent to the structure or in any other way. The Contractor shall not spoil, waste or stockpile excavated material without the approval of the Employer's Representative.

Where outside shuttering is ordered by the Employer's Representative, the excavations shall be carried out for an extra width of not more than 500mm all around the structure, measured from the base of the face to be shuttered, to allow for working space for the shuttering to be fixed.

Payment for excavations shall be measured nett. Over break, or allowance by the Contractor for battered slopes, shall not be measured for payment purposes.

Outside shuttering shall be used for the construction of all major structures unless ordered otherwise by the Employer's Representative.

Where permanent concrete is to be placed against an excavated face, the excavation shall be trimmed to ensure that there is no projection greater than 10mm protruding into the excavation profile.

Material for earthworks shall be obtained from borrow pits only on instructions from the Employer's Representative. In order to avoid the necessity to dispose of surplus material, every endeavour must be made to use the in-situ material in cuttings as earthworks fill material and even as lower selected material where suitable.

**PSD 5.2.2.5 Benching**

Add new Sub-Clause:

The requirements of Sub-Clause 5.2.4.1 (b) of SABS 1200 DM shall apply.

## PSD 5.2.3 Placing And Compaction

### PSD 5.2.3.1 Embankments

Delete the word “90%” and replace with “93%”

Add the following:

Before any placing of fill commences, preparatory work such as site clearing, fencing (where required), and the removal of topsoil and unsuitable ground shall be completed. All drainage structures and culverts shall also be installed unless agreed otherwise by the Employer's Representative. Where the height of fill is 1,0m or less, the natural ground shall be compacted to 95% Mod. A.A.S.H.T.O., before filling commences and where the fill height is greater than 1m compaction shall be to 95% Mod. AASHTO to a depth of at least 150mm in both cases.

#### Bonding

If the natural ground crossfall is greater than 5% the entire interface between the embankment and the natural ground shall be bonded by scarifying to a depth of 150mm.

The thickness of any one layer of fill up to 1m below formation level shall not exceed 150mm after compaction using static rollers, or 300mm using vibrating rollers.

The top 1m layer of fill below formation shall be carried out in layers not exceeding 150mm thickness.

The standard of compaction required shall be-

up to 1m below formation level, 95% Mod. AASHTO. density;

the top 1m layer below formation, 95% Mod. AASHTO density.

The moisture content during compaction of the top 1m layer below formation as determined by the Modified AASHTO compaction test shall be optimum +/-2%.

After compaction, the layer shall be proof-rolled with a vehicle having a minimum wheel load of 20 kN in order to determine any soft spots.

Any layer which becomes soft after being compacted and tested, shall be recompacted to the specified density at the Contractor's expense.

All stones, lumps, etc. shall be broken down to conform to a maximum dimension not exceeding two-thirds of the specified compacted thickness of the layer.

Placing of Fill on Swampy Ground – On swampy ground and at other problem areas but not around structures, the Employer's Representative may permit the pioneering of the embankment by end dumping or bulldozing, but only to the minimum extent necessary to develop adequate facilities for normal placing.

The side slopes shall be trimmed to a plane surface free from loose material and stones larger than 100mm maximum dimension and having no local humps or depressions greater than 150mm. Where the embankment slope is not to receive topsoil, it shall be compacted to provide a stable slope. Where the surface is to receive topsoil it shall be left with a semi-rough finish free from loose material.

Item coverage shall include for: -

Compacting of natural ground before forming embankments to 95% Mod. AASHTO. to a depth of at least 150mm; and

Allowing for shrinkage and wastage of material.

### **PSD 5.2.3.2 Backfilling of Trenches and Backfilling or Filling against Structures**

Add the following:

Excavated material containing little or no organic matter, large clay lumps and excluding stones of average dimension exceeding 200mm may be used for backfill. Suitable material arising from excavations for structures, foundations, footings and the like which is suitable for backfilling shall be stockpiled whilst all other materials from excavations shall be disposed of offsite. Backfill to structures and that used in the formation of embankments shall be compacted to 95% modified AASHTO density respectively.

Where rock is incorporated into the backfill material, the use of rockfill techniques will be required for the formation of embankments. The techniques include the use of heavy grid or padfoot rollers and flooding of the fill to achieve compaction. Portion of the rock may be blended with the softer surface materials, which could be set aside for this purpose. All costs which may arise as a result of these requirements are to be included in the rates.

Contractors are to note that no overhaul of backfill material will be measured and backfill quantities will only be measured up to the pay lines as indicated on the drawings. The Contractor shall be responsible for backfilling any working space and excavation slopes, over breaking, battering etc., beyond the indicated pay lines.

Backfilling around concrete structures shall only begin once the concrete has attained the specified strength i.e. after a minimum 28 days. No backfilling against water retaining structures shall take place before completion of water tightness test.

### **PSD 5.2.4.2 Topsoiling**

Delete the last sentence and replace with:

The final thickness of topsoil after compaction shall be 150mm

### **PSD 5.2.4.3 Grass and other vegetation**

Add to the Sub-Clause:

The topsoil surface of embankments, terraces and other designated areas are to be planted or seeded in accordance with the Environmental Specification and environmental rehabilitation plan, if applicable.

The Contractor shall schedule his planting and sowing in order for this activity to fall within suitable seasonal times in order to ensure adequate and acceptable strike rate.

Newly planted vegetation shall be maintained for a minimum of 3 months to ensure strike rate and growth, however, should vegetation be planted during un seasonal times, maintenance shall continue to ensure growth as required, once the season has turned to conducive growth conditions.

### **PSD 5.2.5 Transport For Earthworks**

#### **PSD 5.2.5.1 Freehaul**

Replace Clause D 5.2.5.1 with the following: -

The freehaul distance for this contract is unlimited. Contractors are to note that **no** overhaul will be paid.

**PSD 5.2.5.2 Overhaul**

Delete Sub-Clause and replace with:

All transportation of all excavated material shall be regarded as free haul and **no** overhaul shall be applicable.

**PSD 6 TOLERANCES**

Add the following to D 6:

The allowable tolerances shall be-

- a) the design angle  $\pm 2$  degrees for the angle of the cut or fill slope;  
not less than the design width for the transverse horizontal embankment width at any level; and  
the layer thickness  $\pm 20$ mm for topsoil;

For the formation, the Contractor will be required to place level pegs longitudinally at 5m intervals on a road construction contract and elevation tolerances shall be taken on a section of the works. (When portion of the works is less than 500m<sup>2</sup> one tolerance reading per 10m<sup>2</sup> shall be taken).

In any section the average of the elevations taken shall be such that the average thickness of the succeeding layer or layers above the formation shall be not less than that specified/nor greater than that specified plus 20mm.

The standard deviation of the differences between the actual and design levels shall not be greater than 10mm.

**PSD 6.3 EXCAVATION BY MECHANICAL MEANS (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Where bulk excavation is carried out by earth moving equipment, such excavation will only be allowed to within a level of 300mm, or less as ordered by the Employer's Representative, above the general level to which the ground has to be reduced, the balance of the bulk excavation being carried out by hand or by other means approved by the Employer's Representative.

**PSD 7 TESTING****PSD 7.2 TAKING AND TESTING OF SAMPLES (NEW SUB-CLAUSE)**

Add to the Sub-Clause:

Determination of the standard of compaction achieved shall be carried out in accordance with Standard methods of testing road construction materials published by the Department of Transport Division of National Roads, Publication TMH 1.

The cost of all control testing is covered under the Preliminary and General section of the Schedule of Quantities.

**PSD 8 MEASUREMENT AND PAYMENT****PSD 8.1 BASIC PRINCIPLES**

Add the following to D 8.1.1:

Items coverage shall include for-

1) Loosening or breaking up unexcavated material before or during excavation.

Allowing for bulking or shrinkage of material before or during excavation.

Blasting where required.

Keeping the earthworks free of water.

Depositing fill to slope away from vertical drainage layers and providing temporary drainage to prevent surface water from entering such drainage layers.

Forming and trimming the slopes.

Restrictions on working at sides of structures.

Taking precautions to avoid damage to structure, existing sewers, drains and services, including providing temporary supports.

The drying of material which cannot be placed immediately in the fill embankments as its in-situ moisture content exceeds the limits specified.

Selecting suitable material of stated types and layering or depositing in locations indicated by the Employer's Representative or in stockpiles.

## **PSD 8.2 COMPUTATION OF QUANTITIES**

Add the following to D 8.2.1.

No allowance will be made for bulking or shrinkage and excavation will be paid as being the volume in place before excavation commenced.

Add the following to D 8.2.3:

Prior to commencement of any excavation, the contractor shall notify the Employer's Representative in good time to ensure that measurements, cross-section, levels of the undisturbed ground, or any other relevant information are taken in order that the excavation quantities can be agreed upon between the Employer's Representative and the Contractor.

Where the Contractor submits survey data this is to be in a continuous ASCII file (csv and LandXML) with a format of each line as name, x, y, z.

The codes used to describe the survey points are to be agreed with the Employer's Representative and to be maintained throughout the Contract.

Handwritten notes or printouts on paper will not be accepted.

The Contractor is to ensure that his appointed surveyor is issued with these details prior to any survey work taking place.

Should the information not be received in either of the specified formats, the data may be deemed to be invalid by the Employer's Representative.

## **PSD 8.3 SCHEDULED ITEMS**

### **PSD 8.3.2 Bulk Excavation**

#### **PSD 8.3.2(a) Excavate in all materials and use for embankment or backfill or dispose of as ordered**

Add "including benching, if applicable" after the words "in addition to the cost of excavation "

In the second and last lines delete "Drawing D-1" and substitute "Fig D-1"

**PSD 8.3.3(a) Restricted Excavation**

Delete from "The rate..... fully specified in 5.2.2.1-5.2.2.3 (inclusive) and 5.2.3" in clause 8.3.3(a) and add the following:

The rate shall cover the cost of complying with the precautions required in terms of PSD 5.1 in addition to the cost of excavation, including benching (if applicable), basic selection, loading, transporting, offloading, stockpiling, re-loading, spreading of backfilling, watering, compacting, final grading, complying with the requirements for tolerances, providing for testing, and disposal of spoil, all in accordance with the requirements of the specification.

In the heading delete "Drawing D-2" and substitute "Fig D-2"

**PSD 8.3.4 Importing Of Materials**

Add the following to D 8.3.4:

The measured volume of imported fill shall be the difference between the net volume of compacted fill and the net volume of suitable material excavated from the site and actually used as compacted fill. For this purpose, it shall be taken that one cubic metre of suitable material excavated from within the site forms one cubic metre of compacted fill.

**PSD 8.3.4.1 From Stockpile**

The rate shall cover the cost of obtaining selected backfill or fill material from stockpile, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% Mod AASHTO density, trimming slopes of embankment to required outline all in accordance with the Specifications. The rate shall also include for carrying out density testing and the disposal of any surplus material.

**PSD 8.3.4.2 From Other Excavations on Site**

The rate shall cover the cost of obtaining selected backfill or fill material from other excavations on site, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% Mod AASHTO density, trimming slopes of embankment to required outline all in accordance with the Specifications. The rate shall also include for carrying out density testing and the disposal of any surplus material.

**PSD 8.3.4.3 From Commercial Sources**

The rate shall cover the cost of acquiring suitable material, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% Mod AASHTO density, trimming slopes of embankment to required outline all in accordance with the Specifications. The rate shall also include for carrying out density testing and the disposal of any surplus material.

**PSD 8.3.5 Working Space**

Add the following to D 8.3.5:

**PSD 8.3.5.1 Bulk Excavation**

The rates for bulk earthworks will be inclusive of materials up to the payline as shown in the drawings. Any additional excavation required is to be included in the tendered rates.

**PSD 8.3.5.2 Restricted Excavation**

The rates for restricted excavation will include for any required allowance for working space. The volume of restricted excavation will be based on the plan area of the structure or item multiplied by the depth measured from the original ground level or a particular datum level agreed prior to commencing excavation.

**PSD 8.3.6 Overhaul**

Delete item (a)

Delete item (b):

Add to Clause:

**No** overhaul payment will be applicable.

**PSD 8.3.7 Additional Lateral Support**

Replace D 8.3.7 with the following:

In compliance with clause D5.1.2, the tendered rate for Excavation and Backfilling shall include for the provision of temporary lateral support where this is required.

This item will not be considered for use by the Contractor for general shoring required to facilitate trench stability in terms of the relevant safety legislation.

All temporary works to be carried out in accordance with the Occupational Health & Safety Act, 1993 (Act 85 of 1993): Construction Regulations 2014 and applicable sections of SABS 1200. The design of any temporary works including shoring shall be carried out by a registered professional engineer.

The sum will be an amount to cover the direct extra cost of all operations required of the Contractor to provide the additional lateral support as ordered and the cost of delays and disruption as agreed with the Employer's Representative.

**PSD 8.3.11 Grass and Other Vegetation**

Add to the Sub-Clause:

The rate shall cover the cost planting sods on embankments and/ or terraces and seeding of other designated flat areas inclusive of fertilising, watering until the area is fully covered with grass and maintenance by the Contractor for a minimum period of three months, during suitable seasonal times. This will include watering and weeding of the planted areas as per Clause PSD to the satisfaction of the Employer's Representative and the costs of complying with this requirement are to be included in the rates for grass planting. Should vegetation be planted during unseasonal times, maintenance shall continue to ensure growth as required, once the season has turned to conducive growth conditions.

**PSD 8.3.14 Top soiling From Commercial Sources**

Add new Sub-Clause:

The rate shall cover the cost of procuring the topsoil from commercial source, transporting, and spreading in terms of 5.2.4.2 where no topsoil is available from stockpiles.

**PSD 8.3.15 Trimming Of Embankments - Machine Trimming**

Add new Sub-Clause:

The unit of measurement shall be the metre (m<sup>2</sup>)

The rate shall cover the cost of all works required to trim and shape embankments to a suitable level to the satisfaction of the Employer's Representative. Measurements shall be in square metres (m<sup>2</sup>) measured along the shape of the embankment.

#### **PSD 8.3.16 Trimming Of Embankments - Hand Trimming**

Add new Sub-Clause:

The unit of measurement shall be the metre (m<sup>2</sup>)

The rate shall cover the cost of all works required to trim and shape embankments to a suitable level to the satisfaction of the Employer's Representative. Measurements shall be in square metres (m<sup>2</sup>) measured along the shape of the embankment.

#### **PSD 8.3.17 Barricading (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be the metre (m) for any of the type of barricading or fencing specified under PSD 5.1.1.1 – Barricading and lighting

The quantity for these items will always be reflected as provisional quantities.

Barricading will be measured as inclusive of both sides of the working corridor by the total linear length in metres, parallel to excavations and sundry structures or where to be erected as instructed by the Employer's Representative. The materials for each barricade type may be re-used as the working front progresses and the tendered rates shall include for manufacturing, delivering to site, erection, maintenance, provision of access points as well as closing off at ends of work fronts as well as dismantling and re-erection at different locations as and where required.

Barricading material shall be functional at all times and shall be replaced when such functionality is not to the satisfaction of the Employer's Representative.

The rate for Armco type barriers shall be deemed to include for the reinstatement of the paved road surface in terms of PSD 5.1.1.1- Item 5

#### **PSD 8.3.18 Survey Of Surrounding Structures Before Blasting (New Sub-Clause)**

Add new Sub-Clause:

The rate for Extra Over for excavation in rock shall cover the cost to examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting and establish and record together with the owners thereof the extent of cracking or damage that may exist before commencement of blasting operations.

#### **PSD 8.3.19 Photographic Record (New Sub-Clause)**

Add new Sub-Clause:

The rate for Extra Over for excavation in rock shall cover the cost of providing a photographic record of neighbouring structures before blasting commences.

#### **PSD 8.3.20 TOPSOILING**

The unit of measurement shall be square metre (m<sup>2</sup>).

Add new Sub Clause:

The rate shall cover the cost of excavating from stockpiles, hauling, spreading and ripping of the top 400mm layer of topsoil to enhance establishment of new plants.

The tendered rate shall include for full compensation for plant, materials, fuel and labour necessary to ensure ripping of compacted tracks to a maximum depth of 400 mm.

#### **PSD 8.3.21    BERMS**

The unit of measurement shall be metre (m).

Add new Sub Clause:

The following conditions apply to contour/diversion berms

- Berms shall be constructed in such a manner to ensure that water is diverted to a less erodible location.
- Berms shall be at least 500mm high (+- Variance of 10mm) at its highest point relative to the surrounding soil.
- Contour berms shall be at least 300mm (+- Variance of 10mm) deep to the lowest point relative to the surrounding soil.
- Contour berms shall be adequately compacted to avoid erosion.
- Contour berms shall be constructed with the installation of a geosynthetic liner such as "Kaytech Soilsaver 292" or similar approved product where required. The Employer's Agent will instruct on requirements, based on local conditions when finishing off the work.
- Contour berm exit points shall be fitted with the installation of "Kaytech Grassfence" (or similar approved product) across the width of the berm at the exit point, splayed at 30 degrees towards the slope upper side with the curtain embedded into the berm invert by at least 75mm.
- All geofabrics used must be anchored in the invert.
- Contour berms shall be approximately 1000mm wide.

**PSDB EARTHWORKS (PIPE TRENCHES) (SABS 1200 DB – 1989)****PSDB 3 MATERIALS****PSDB 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES**

Amend this clause to read similar to that described under clause PSD 3.1 of the Variations and Additions to the Standardised Specification for Earthworks (SABS 1200 D – 1988)

**PSDB 3.3 SELECTED GRANULAR MATERIAL**

Delete Sub-Clause and replace with:

See Clause PSLB 3.1

**PSDB 3.4 SELECTED FILL MATERIAL**

Delete Sub-Clause and replace with:

See Clause PSLB 3.2

**PSDB 3.5 BACKFILL MATERIAL**

(a) In the third line delete “150mm” and substitute “100mm”.

(b) In the second line delete “P.I not exceeding 12” and substitute “P.I not exceeding 6”.

**PSDB 3.7 SELECTION**

Add the following to DB 3.7:

Contractors are advised that the stockpiling of excavated material suitable for use as backfilling, will be permitted alongside trench excavations where possible. All other excavated material unsuitable for re-use, either as backfill or for the formation of embankments shall be disposed of at the spoil site. No overhaul will be paid.

**PSDB 5 CONSTRUCTION****PSDB 5.1 PRECAUTIONS****PSDB 5.1.2.2 Special water hazards**

Add to the Sub-Clause:

The Engineer may direct the Contractor to implement subsoil drainage measures at certain sections of the pipe trench where ground water seepage is considered significant. Such drainage measures shall consist of a free draining granular material such as 25mm crushed stone wrapped in porous geo-membrane placed underneath and/or alongside the pipe and/or in separate drainage trenches from where a suitably sized pipe, as directed by the Engineer, will lead the collected water away from the pipeline trenches.

This work shall be undertaken as per the relevant detail drawing as instructed on site by the Engineer.

### PSDB 5.1.2.3 Sloping ground

Delete the Sub-Clause and replace with:

The Contractor shall be responsible throughout the duration of the Contract, inclusive of the Defects Liability Period, for the provision of all soil erosion preventative measures necessary to protect the trenches, pipeline(s), road works, reinstated work and land utilised by the Contractor during the Contract, from any adverse effects of soil erosion, settlement, scour, etc, resulting from the construction of the works. The Contractor shall deploy whatever systems needed in order to give effect to this requirement.

Once reinstatements have been completed along sections not in a road reserve, contour/diversion berms, generally extending across the full width of the working corridor, consisting of low earth mounds shaped to rounded form and so oriented as to have a fall of 1% along their length, in general terms, shall be constructed with compacted non erodible material having a minimum density of 90% modified AASHTO density and minimum dimensions and maximum spacings dependent on the slope of the ground along the length of the pipeline.

The height of the contour/diversion berms for a distance of 1 metre on either side of the trench centreline shall be raised 150 mm above the remainder of the cross-embankment to allow for settlement. In order to form a satisfactory drainage channel upstream of each cross-embankment (at a slope of 1%) the crown over the backfilled trench shall be removed for a distance of 0,5 m upstream of the cross-embankment.

Contour/diversion berms shall be constructed to the same minimum standards and dimensions indicated wherever artificial slopes have been formed in the working corridor, or other areas used during construction and with the approval of the Engineer, are permitted to be left as is.

The following general conditions apply to contour/diversion berms

Contour berms shall be constructed on slopes with gradients of between 1:100 and 1:1 (Slope Categories 1, 2 and 3), upon instruction by the Engineer.

Contour berms shall be constructed as per cross section detail A noted below.

Where contour berms are constructed on soils with a high (>35% clay) content the gradient of the canal at the base of the up-slope side of the bank shall be 1:100 and on loam soils (35 – 15% clay) the gradient of the canal shall be 1:200.

Where the construction corridor runs primarily across the contours the contour berm shall extend across the entire width of the cleared corridor and the discharge end of the contour berm must, where possible, extend into adjacent vegetation for a distance of 3.0 metres.

Where the construction corridor runs more or less parallel to the contours contour berms may not exceed 300m in length without provision being made for captured runoff to exit the berm.

Where a berm which is parallel to the contour is constructed, and is less than 150m long, the gradient for the runoff canal should be 2% on soils with high clay content and 1.5% on loam soils. Where a berm which is parallel to the contour is constructed and is between 150m and 300m long the gradient for the runoff canal for both clay and loam soils must be 1%.

Ideally, water discharged from the end(s) of such berms should be into a natural watercourse which does not display signs of accelerated erosion within a distance of 500m from the downside of the corridor.

In the event that a natural watercourse does display signs of accelerated erosion within 500m of the downside of the corridor, measures, such as installation of a suitable geotextiles, or structures such as a reno mattress,

must be put in place before runoff associated with the corridor is discharged into it.

Contour berms shall be constructed in such a manner to ensure that water is diverted to a less erodible location.

Contour berms shall be at least 300mm high (+/- Variance of 10mm) at its highest point relative to the surrounding soil.

Contour berms shall be at least 300mm (+/- Variance of 10mm) deep to the lowest point relative to the surrounding soil.

Contour berms shall be adequately compacted to avoid erosion.

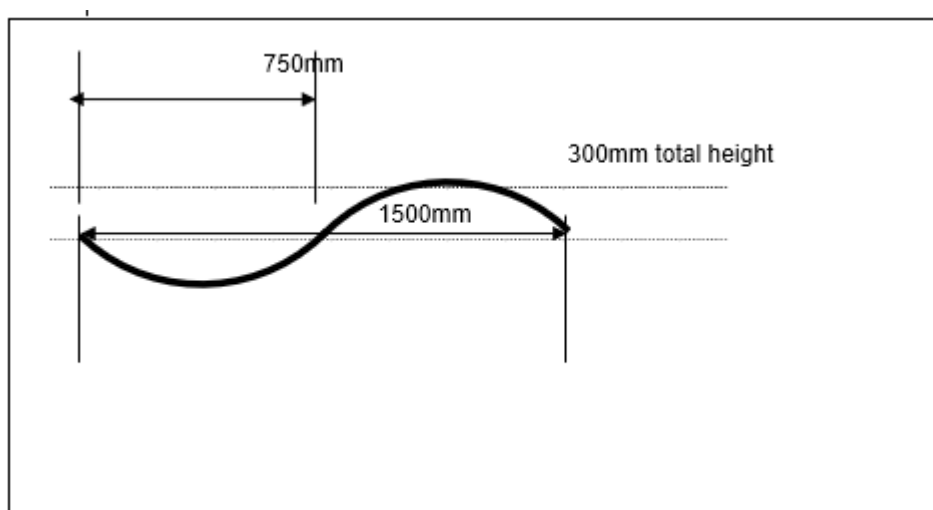
Contour berms shall be constructed with the installation of a geosynthetic liner such as "Kaytech Soilsaver 292" or similar approved product where required. The Engineer will instruct on requirements, based on local conditions when finishing off the work.

Contour berm exit points shall be fitted with the installation of "Kaytech Grassfence" (or similar approved product) across the width of the berm at the exit point, splayed at 30 degrees towards the slope upper side with the curtain embedded into the berm invert by at least 75mm.

All geofabrics used must be anchored in the invert.

Contour berms shall be constructed at vertical intervals determined by slope gradient as identified in the table below:

Detail A - Berm Shape Cross Section



The following table specifies the **vertical** interval between contour berms which must be constructed on slopes of different steepness. Note that on slopes of 1:5 and steeper contour berms are to be used together with geotextiles to reduce soil loss and slope failure.

Table Vertical intervals (metres) for soils with moderate potential risk of eroding in areas experiencing a mean annual rainfall of 750-800mm and greater

Vertical intervals (m) for soil with medium erodibility potential	Land Slope (%)	2	3	4	5	6	7	8	9	10	11	12
Vertical intervals (m)		0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8

**Geofabric Products**

Only geotextile material which is supplied by a company which provides on-site training on how their product(s) should be installed may be used.

The Contractor shall provide written confirmation to the Engineer of the staff who have attended the Supplier's onsite training courses on how their product(s) should be installed.

**Woven 100% Natural Jute Fibre as Kaytech Soilsaver 292® or similar approved product**

Will be utilized on slopes with a gradient of 1:5 and steeper up to, but not exceeding 1:2.(Slope Category 2)

Will be installed in consultation and in accordance with the manufacturer's specifications.

**Woven 100% Natural Jute Fibre such as Kaytech ECC-2B double net blanket, Biomac-C® or similar approved product**

Will be utilized on slopes with a gradient of 1:2 and steeper up to but not exceeding 1:1.(Slope Category 3)

Shall be installed in consultation and in accordance with the manufacturer's specifications.

**Woven tape strips arranged in a cellular honeycomb structure such as Kaytech Multi Cell®, Maccaferri – Armater® or similar approved product**

Will be utilized, upon instruction from the Engineer, on slopes of 1:1 and steeper (Slope Category 4) depending upon soil conditions.

Will be installed in consultation with the supplier and in accordance with the manufacturer's specifications.

**Woven 100% Natural Jute Fibre with double twisted hexagonal woven steel wire mesh such as Maccaferri-MacMat-R® or similar approved product**

Will be utilized, upon the instruction of the Engineer, on slopes of 1:1 and steeper (Slope Category 4) up to near vertical faces.

Will be installed in consultation and in accordance with the manufacturer's specifications.

**PSDB 5.1.2.4 Cross walls in trenches (New sub-clause)**

Add new Sub-Clause:

Where indicated on the drawings or as instructed by the Engineer, the Contractor shall construct cross walls in the trench on steep sections of the pipeline to prevent bedding from becoming a drainage path for ground water.

**PSDB 5.1.4 Existing Services That Intersect Or Adjoin Trenches**

The requirements of PSD 5.1.2 and the relevant Project Specification clauses are applicable.

**PSDB 5.2 MINIMUM BASE WIDTHS**

In the 3<sup>rd</sup> and 5<sup>th</sup> line, delete the word "External" and replace with "Nominal." Delete the table and replace with the following table:

Nominal Diameter of Pipe Barrel		Side Allowance on each side (mm)
Over	Up to and Including	
-	DN 125	300
DN 125	DN 500	300
DN 500	DN 1 000	600
DN 1 000	-	600

Add to the Sub-Clause:

A greater base width may be allowed at the discretion of the Employer's Representative, provided that the Contractor proves to the Employer's Representative that the working space allowed by this Sub-clause is insufficient to carry out his pipe laying and backfilling activities in accordance with the specification. The tendered rates for excavation of pipe trenches shall be deemed to include for a greater base width as specified in this clause, should the Contractor wish to use a greater base width than that indicated.

Trench sides shall be as near vertical as possible in order to minimise the quantity of backfill material required and to avoid possible difficulties where pipelines have to be installed parallel to existing services, fences, hedges, etc and to minimise the loading on the pipe.

The tendered rate for the excavation for pipe trenches shall include for the excavation of bell/ fox holes at pipe joints and/or segmented bends.

## **PSDB 5.4 EXCAVATION**

Add to the Sub-Clause:

The length of pipe trench excavation for the laying of the water pipeline, shall be limited in terms of the relevant Project Specification Clauses.

Where the pipe trench crosses surfaced roads the Contractor shall neatly cut two parallel grooves into and through the surfacing before excavating between the grooves. The grooves are to be set back at least 200mm from the edge of the excavation face to prevent ravelling of the cut edge. The cost of this operation, shall be deemed to be included in the tendered rates for pipe trench excavation.

The precautions for excavations as specified in Clause 5.1.1 of Section SABS 1200 D, 1200 DA and the relevant clauses in PSD and PSDA shall also apply to all trench excavations.

The Contractor shall take all the steps necessary to ensure that no person is required or allowed to work in a trench or any other unsupported overhanging excavation which is more than 1,5 m deep, and any excavation which has not been adequately supported, shored or braced if there is any danger whatsoever of the sides of the excavation collapsing. The support, shoring or bracing to be designed and constructed by the Contractor, shall be strong and sturdy enough to support the sides of the excavation in question. Should conditions on site require support, shoring or bracing at depths shallower than 1.5m, then the required safety measures shall be implemented.

Where a stormwater or sewer pipe crosses a road in fill or an area to be filled, trench excavation shall take place before the road or area is filled. The Works shall be measured as per item 8.3.2 and PSBD 8.1.2 (c).

Where site conditions permit, all materials excavated and required for backfilling shall be removed and neatly stacked where possible along the higher side of the trench, care being taken to restrict the area so occupied so as to cause the minimum of obstruction. Care shall be taken to protect existing structures such as walls, fences, gateways and also hedges, trees, gardens, etc., from damage by material so stacked.

## General

- a) Excavation shall be undertaken in whatever material is encountered and to such levels and widths as are indicated on the drawings, in the specification and as instructed by the Engineer. Trench excavation shall be undertaken in narrow trenching conditions with vertical sides necessitating the use of shoring and open battered trench excavation will not be permitted unless otherwise stated in Project Specification.

Control of the dimensions of the excavations shall be by means of boning rods and sight rails, an acceptable base beam device or other approved method. If the first method is used the Contractor shall erect sight rails over the centre of each manhole or vertical bend and along the length of the excavation with a maximum distance of 30m apart and with a minimum number of 3 for any one length of excavation being undertaken. The centre line of the pipeline shall be denoted on each sight rail both back and front by a single vertical line and either side of the centre line painted with contrasting colours.

The Contractor shall place a reference peg alongside each sight rail, take the levels and give their values to the Engineer.

Should the Contractor excavate to a greater depth than specified he shall, at his own expense, replace the excess material so removed with selected fill compacted to 93% Mod. AASHTO density, or grade 10/26 concrete if the use of selected fill is not practical.

Where site conditions permit, all materials excavated and required for backfilling shall be removed and neatly stacked where possible along the higher side of the trench, care being taken to restrict the area so occupied so as to cause the minimum of obstruction. Care shall be taken to protect existing structures such as walls, fences, gateways and also hedges, trees, gardens, etc., from damage by material so stacked.

### **PSDB 5.4.1 Open Trench Limits (New Sub-Clause)**

Add new Sub-clause:

The open trench limits are governed by the relevant Project Specification clauses.. All aspects of lengths of work fronts as specified in this clause shall be enforced at all times.

### **PSDB 5.5 TRENCH BOTTOM**

Replace "90% "with "93%".

Add to the Sub-Clause:

Should any portion of a pipe trench exceed the specified depth, the Contractor shall be held responsible for any additional costs which may arise as a result of such over-excavation. Where the Contractor has over excavated the depth of the trench, the Contractor shall at his own expense replace the excess material so removed with suitable fill material compacted to 93% MAASHTO density or with 10Mpa concrete, as directed by the Employer's Representative.

Where unsuitable soft, wet material occurs on the trench bottom, the Employer's Representative may instruct the Contractor to remove such material and replace with other granular material selected from the site or imported. This material will be used to make up the soft material removed, up to the level of the bottom of trench. Upon instruction by the Employer's Representative, selected rock fill will be required to make good the unsuitable soft material. The surface of this selected rock fill (as instructed by the Employer's Representative) shall be levelled off using pipe cradle material or stone bedding. Should

such selected rock fill not be available, the Employer's Representative will instruct the Contractor to use clean, free draining granular material.

For welded steel pipes, the trench shall be widened and deepened over a suitable length at the joints on each side of and beneath the pipe to allow working space for the jointing. This additional excavation is to be included in the tendered rates for trench excavation.

## **PSDB 5.6 BACKFILLING**

### **PSDB 5.6.1 General**

Add to the Sub-Clause:

Notwithstanding the requirements of Sub-Clauses 5.6.1 and 5.6.6, no pipe joint or pipe fitting shall be covered by either blanket or backfill material prior to the successful completion of the necessary tests on the welded joints, the hydraulic pressure test of the pipeline and on the joint wrapping at such joints.

### **PSDB 5.6.2 Material For Backfilling**

Delete second paragraph and substitute the following:

Hard rock material shall not be used for, or incorporated into, the backfill above the blanket layers without the Employer's Representative approval.

### **PSDB 5.6.3 Disposal Of Soft Excavation Material**

Add the following:

Material which the Employer's Representative considers to be unsuitable for the bottom of the trench shall be excavated to depths as instructed and disposed of as surplus material. The resultant space shall be refilled, as ordered, with approved material and compacted to a 93% Mod. AASHTO density.

### **PSDB 5.6.4 Disposal Of Intermediate And Hard Rock Material**

Delete the Sub-Clause and add the following:

Surplus intermediate and hard rock material from trench excavations shall be disposed of offsite to an approved spoil disposal site.

## **PSDB 5.7 COMPACTION**

Add to the Sub-Clause:

The Contractor shall make provision in his rates for compaction of trench backfill and compaction where such backfill to be compacted has to be with suitable equipment and machinery, small enough to fit into trench dimensions. The Contractor cannot assume the use of large road works machinery for the purpose of trench backfill and compaction where not suitable. All tendered rates shall be deemed to include for the compaction under restricted trench widths where required.

### **PSDB 5.7.1 Areas Not Subject To Traffic Loads**

In the second line, delete 300 mm and replace with 150 mm.

In the third line, replace the words 90% of modified AASHTO with 95% of modified AASHTO.

Add to the Sub-Clause:

Particular attention shall be paid to compaction of material in the pipe haunch area. Material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 150 mm (measured loose) and carefully compacted to avoid movement and deflection of the pipe.

The Contractor is to take special care not to inflict damages to the pipe coating when compacting bedding and blanket materials close to the pipe.

## **PSDB 5.7.2 Areas Subject To Traffic Loads**

In the third line, replace the words 93% of modified AASHTO with 97% of modified AASHTO and replace the words 95% of modified AASHTO with 98% of modified AASHTO.

Add to the end of the sentence:

... for an extent of 2m on either side of the carriage way at each crossing.

Add to Sub-Clause:

All backfill to pipes under roads and in road reserves shall comply with the requirements of sub-clause 3.5(b) and shall be compacted in accordance with Sub-Clause PSDB 5.7.2

Add to the Sub-Clause:

Particular attention shall be paid to compaction of material in the pipe haunch area. Material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 150 mm (measured loose) and carefully compacted to avoid movement and deflection of the pipe. The Contractor is to take special care not to inflict damages to the pipe coating when compacting bedding and blanket materials close to the pipe.

## **PSDB 5.9 REINSTATEMENT OF SURFACES**

### **PSDB 5.9.4 Bitumen Roads, Sub Base And Base**

Add to Sub-Clause:

The Contractor shall include in his tendered rates for the reinstatement of all surfaces and including for all layerworks, to their conditions prevailing before the commencement of construction.

Items have been included in the Bill of Quantities to price for the reinstatement of certain surfaces (concrete and/or asphalted/gravel driveways and/or roads) and for payment purposes, the area of those specific surfaces shall be calculated from the product of the length of the trench and the specified trench width plus 400mm (refer PSDB 5.4).

## **PSDB 5.11 TRENCH WALL STABILITY (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Notwithstanding the requirements of PSDB 5.4.1, the Contractor shall take responsibility for the length of trench open at any time and if collapse of the side walls occurs for any reason, the responsibility will be the Contractors and he will reinstate and make good at his own cost.

## **PSDB 5.12 SAFETY (NEW SUB-CLAUSE)**

Add new Sub-Clause:

The Contractor shall comply with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) when conducting trench excavations.

In terms of Sub-Clause 5.3 of SABS 1200A, the Contractor is responsible for providing shoring where necessary.

The Contractor shall meet his obligations for shoring of trenches in terms of legislative requirements, under all circumstances.

### **PSDB 5.13 JOINTING HOLES (FOX HOLES) (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Jointing holes for pipes, also defined as Fox Holes in this specification, shall be formed of sufficient length and depth to allow working space for the proper jointing and wrapping of the pipe joints, pipe specials and other fittings which require wrapping.

After the pipe work has been inspected, tested, hydraulically tested and approved by the Employer's Representative, the jointing holes shall be backfilled and compacted to the same specification as that of the bedding material and compaction of trenches as specified under Clauses PSLB 3.

No additional payment will be made for forming and backfilling of fox holes, the cost of which is deemed to be included in the tendered rates for the excavation of pipe trenches.

### **PSDB 7 TESTING**

Add the following:

The Contractor shall maintain accurate and up to date records of all materials, processes, process parameters and measurements necessary to ensure compliance with this specification. The format of the data to comply with the requirements as specified under the section dealing with the construction dossier.

The Contractor's quality control records shall be available for inspection at all times. Copies of these records shall be made available on request.

The contractor shall carry out process control checks on the compaction of the backfill of all trenches.

The Employer's Representative may appoint a 3<sup>rd</sup> party inspection authority to carry out quality surveillance on its behalf. The Contractor shall provide all facilities and access to works at all reasonable times as may be necessary for the independent body to carry out its function.

Quality surveillance will be undertaken by the Employer's Representative:

- a) when requested by the Contractor
- at the discretion of the Employer's Representative

Advance notice of a minimum of 8 normal working hours shall be given by the Contractor to the Employer's Representative when requesting inspection of any portion of the works.

Notwithstanding any surveillance carried out by the Employer's Representative, the Contractor shall retain full responsibility for the quality of all trench compaction carried out under the contract.

The cost of all control testing by an independent 3<sup>rd</sup> party inspection authority is covered under the Preliminary and General section of the Schedule of Quantities.

Density readings will be taken at random over the layer. The layer is acceptable should the Quality Surveillance fulfil the following requirements:

$$X \geq A \% + 0,5S$$

where :

X = Arithmetic mean of density readings for the layer.

A = Percentage Mod. AASHTO as defined in the specification for the layer.

S = Standard deviation.

The compaction control testing shall be carried out by the Contractor.

Density

Position	Roadways, Sidewalks	Other Locations
Trench formation	1 No. per 30 linear m	1 No. per 100 linear m
Bedding Cradle & Selected Fill Blanket	2 No. per 30 linear m	1 No. per 100 linear m per layer
Backfill	1 No. per layer per 15m <sup>2</sup> or part hereof	1 No. per 2 layers per 50m <sup>2</sup> or part hereof

If the results of such density tests (which shall not be taken on the bedding material directly above the pipe) show that the material has been compacted to a density equal to or in excess of the applicable specified value (refer to Clause 5.7), the compaction will be accepted. If the density is found to be below the specified value, the Employer's Representative may order the re compaction and retesting of the backfill at the Contractor's expense.

The cost of testing shall be deemed to be included in the rates for excavation.

## **PSDB 8 MEASUREMENT AND PAYMENT**

### **PSDB 8.2 COMPUTATION OF QUANTITIES**

#### **PSDB 8.2.4 Shoring**

Add to sub-clause:

Except where shoring is specifically ordered by the Employer's Representative, the cost of shoring used, as well as the cost of any additional excavations required to install the shoring, will be deemed to be included in the rates tendered for the excavations. All shoring costs to meet legislative requirements shall be for the account of the Contractor.

#### **PSDB 8.3.2 Excavation**

##### **PSDB 8.3.2 (a)**

Add the following to Sub-Clause

All trench excavation shall be restricted excavation within confined working widths. The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his excavation rate for every eventuality, covering restricted access, confined spaces, close proximity to houses, shoring, high traffic volumes, accommodating traffic, providing access for pedestrian users, working in road reserves of various widths,

working in working corridors of restricted width, shoring and working in the vicinity of existing services.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the excavation of the pipe trench, the removal of spoil and all other aspects that require consideration in order to excavate the pipe trench.

Excavation for cable ducts shall be measured under this clause.

### **PSDB 8.3.2 (b)**

Add the following to Sub-Clause:

Unit of measurement shall be m<sup>3</sup>

- 1) Hand excavation and backfill where ordered by the Employer's Representative
  - a) Boulder Excavation Class A
  - b) Boulder Excavation Class B
  - c) E/O for excavation at grades steeper than 1:3

Measurement of Extra Over will not apply to any length of trench in soft material more than 2m long. Surplus boulder material from trench excavation shall where applicable, be disposed of to the designated spoil areas.

### **PSDB 8.3.2 (c)**

Add the following sub-items in 8.3.2 after sub item 8.3.2(c):

Unit of measurement shall be m<sup>3</sup>

Excavate in all materials for stormwater inlet and outlet structures and for manholes, catchpits, valve chambers and the like, irrespective of depth and backfill around structures :

The unit of measurement shall be the cubic metre of material excavated, measured in place according to the authorised dimensions, and excluding the volume of material excavated and paid for under sub-item (a).

The tendered rate shall include for the costs of excavating in all materials, backfilling, compacting, trimming and tidying of the final surface around the structure, disposing of surplus and unsuitable materials within the freehaul distance and where applicable, selecting and keeping separate, excavated material suitable for use as backfill.

Excavate open drains in all materials

The tendered rates shall include full compensation for excavating in all materials within the dimensions specified or authorised by the Engineer and to the specified lines and profiles, for the disposal of surplus and unsuitable excavated material where applicable, and in the case of item (d), for backfilling with suitable approved material compacted to 93% of modified AASHTO density around the structures.

Extra-over sub-items 2 and 3 for excavating in:

- d) Intermediate material
- e) Hard rock material

Measurement and payment shall be in accordance with the provisions of 8.3.2(b) of SABS 1200D (as amended)."

### **PSDB 8.3.3 Excavation Ancillaries**

#### **PSDB 8.3.3.3 Compaction in Road Reserves**

Add to the Sub-Clause:

"In the case of gravel roads, determining the volume, the depth will be measured from the underside of the gravel wearing course to the top of the fill blanket, and in the case of bitumen roads, from the underside of the subbase to the top of the fill blanket".

The rest of the trench shall be backfilled as specified in Clauses 5.9.3, 5.9.4 and 5.9.5, as applicable.

### **PSDB 8.3.4 Particular Items**

Add to Sub-Clause:

The unit rate for trench shoring to remain in the excavation shall include for-

the supply and placing of trench shoring and other support measures; maintenance; and additional costs for backfilling and compaction with trench supports left in trench.

### **PSDB 8.3.5 Existing Services That Intersect Or Adjoin A Pipe Trench**

Under Item a) in the 5th line, delete the phrase "...whether or not their presence is known before they are uncovered..."

Add to the Sub-Clause:

(v) all work involved in locating the service by hand excavation;

(vi) notifying the proprietor of the service;

(vii) supporting and protecting the service while the pipeline is installed, inspected, tested and backfilled.

### **PSDB 8.3.8 Soilcrete (New Sub-Clause)**

Add new Sub-Clause:

The unit measurement shall be the cubic metre (m<sup>3</sup>).

Soilcrete shall consist of an approved soil or gravel mixed with 5% by mass of Portland Cement and only sufficient water to give it a consistency that will permit the soilcrete to be placed, using vibrators. The material used for soilcrete shall be sandy granular material of the following specifications:

Minimum Grading Modulus:	1,2
Maximum Plasticity Index:	10 %
Maximum particle size:	38 mm

Detrimental percentages of silt and clay shall be avoided.

The soilcrete shall be mixed on site using suitable concrete mixers and the water and cement contents shall be carefully controlled. It shall be placed and thoroughly compacted by means of concrete vibrators so that all voids are filled.

The unit rate shall also include for-

- supply of cement and any other materials required ;
- all mixing and processing of the material: and
- complying with any time restriction.

**PSDB 8.3.9 Construction Of Impervious Clay Barrier Across Pipe Trenches To Prevent The Flow If Groundwater In Bedding Material (New Sub Clause)**

Add new Sub-Clause:

The unit measurement shall be the cubic metre (m<sup>3</sup>).

Payment for impervious clay barrier across pipe trenches, as per the relevant drawing in terms of the instruction by the Engineer, will be by m3 of material compacted to construct cross walls in accordance with the specification

**PSDB 8.3.10 Extra over for excavation of pipe trenches in areas of restricted access (New Sub Clause)**

The unit of measurement shall be square metre (m<sup>2</sup>).

Add new Sub Clause:

The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his rate for every eventuality, covering restricted access, confined spaces, high traffic volumes, accommodating traffic where required, providing access for road users to properties, working in road reserves of various widths, working in working corridors of restricted width, working in the vicinity of archaeological findings or areas of historical importance which requires special care to be taken to protect same or whichever condition might present itself during construction.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the excavation of the pipe trench, the removal of spoil and all other associated activities that are impeded as a result of difficult access, the management of traffic flow and all other aspects that require consideration in order to excavate the pipe trench.

The Contractor shall ensure that residents have access to their properties and that access to relevant road users is maintained at all times, that traffic control is exercised as per the relevant specification and that the appropriate construction technique is utilized for the specific site constrictions. Refer to SANS 1921.

The Contractor shall familiarize himself with the pipeline route and the terrain over which the pipeline is to be constructed and the tendered rates under Item PSDB 8.3.2 and this item shall be deemed to include for all eventualities to excavate the pipe trench. No Extra Over for the excavation of pipe trench in areas of restricted access will be considered other than for the sections noted in the Bill of Quantities.

**PSDB 8.3.11 Ripping**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Ripping of the top 400mm layer of top soil to enhance establishment of new plants.

The tendered rate shall include for full compensation for plant, materials, fuel and labour necessary to ensure ripping of compacted tracks to a maximum depth of 400 mm.

**PSDB 8.3.12 Contour (Diversion) Berms**

Add new Sub Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include full compensation for the plant, labour and fuel to shape and compact contour (diversion) berms.

Measure per m length. Planting on berm is extra over to berm construction.  
Creation and finishing off of contour berms in terms of the specification.

**PSDB 8.3.13 Geofabric Product Application**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Geosynthetic application based on Engineer's decision what to use so quantities are provisional.

**PSDB 8.3.13.1 Woven 100% Natural Jute Fibre as Kaytech Soilsaver 292® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications.

**PSDB 8.3.13.2 Woven 100% Natural Jute Fibre such as Kaytech ECC-2B double net blanket, Biomac-C® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications.

**PSDB 8.3.13.3 Woven tape strips arranged in a cellular honeycomb structure such as Kaytech Multi Cell®, Maccaferri – Armater® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications. The rate shall include for the filling of cells with topsoil/treated topsoil as required.

**PSDB 8.3.13.4 Woven 100% Natural Jute Fibre with double twisted hexagonal woven steel wire mesh such as Maccaferri-MacMat-R® or similar approved product**

Add new Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications. The rate shall include for the filling of cells with topsoil/treated topsoil as required.

**PSDK GABIONS (SABS 1200DK)****PSDK 1 SCOPE**

Add to Sub-Clause:

This specification also applies to Reno Mattresses, Terramesh and the materials that they are manufactured of. For simplicity the word "Gabion" is used and may be changed or have the words Reno Mattress and/or Terramesh added singularly or in combination as appropriate unless specifically stated otherwise. In general, for protection over large flat areas the word "mattress" describes the implementation of a small height gabion basket. The word "Plastic Coated" refers to a UV stabilised/resistant polymer coating extruded over the externally-coated wire.

**PSDK 2 INTERPRETATIONS****PSDK 2.3 DEFINITIONS**

Add to the Sub-Clause

Box dimensions for gabions are stated under sub-clause PSDK 3.1.2.

Wire for cages need to zinc/Al coated and not just zinc coated.

Mattress dimensions are sated under sub-clause PSDK 3.1.2.

**PSDK 3 MATERIALS****PSDK 3.1.1.1 Quality**

Add to the Sub-Clause:

The stone shall be subjected to the weathering test.  
The stone shall be subjected to the durability test.

**PSDK 3.1.2 Gabion Cages And Mattresses**

Add to the Sub-Clause:

Wire for wire baskets (Mattress and/or Gabion structures) shall be double twisted hexagonal steel wire mesh manufactured to SANS 1580 with wire being coated with Galfan coating and additional outer Polymer PVC coating where required.

The gabion baskets shall be as follows:

Boxes of double twisted, hexagonal wire mesh gabions of nominal 80mm mesh made up from minimum of 3.4mm o/d frame wire and 2.7mm o/d mesh wiremesh wire to SANS 1580 coated in Galfan, complete with partitions at 1m centres, complete as described in SANS 1200DK and in the following sizes: -

<b>L</b>	<b>W</b>	<b>H</b>
1.0m	1m	.5m
1.0m	1m	1m
1.5m	1m	1m
2.0m	1m	1m
3.0m	1m	1m
4.0m	1m	1m

Gabion tails lengths as specified in the Bill of Quantities and/or on the drawings.

Mattress baskets shall be as follows:

Boxes of double twisted, hexagonal wire mesh gabions of nominal 60mm mesh made up from minimum of 2.2mm o/d mesh wire with zinc/Al5% coating, complete with partitions/diaphragms in the following sizes: -

<b>L</b>	<b>W</b>	<b>H</b>
2.0m	1m	.17m
2.0m	1m	.23m
2.0m	1m	.30m
2.0m	2m	.17m
2.0m	2m	.23m
2.0m	2m	.30m
3.0m	2m	.17m
3.0m	2m	.23m
3.0m	2m	.30m

### **PSDK 3.1.3 Geotextile**

Add to the Sub-Clause:

The geotextile shall consist of 100% polyester continuous non-woven filaments having a mass of 210g/m<sup>2</sup> with minimum energy absorption of 6.5kJ/m such as "AG200".

The filter blanket must be attached to the gabion wall, basket or mattress by an approved method of fastening, which must ensure that the blanket will stay in position during construction of the infilling behind the gabion wall. The material to be used as fill immediately adjacent to the gabion wall must have good drainage properties to ensure that there is no build up of pore pressure behind the wall and be free of sharp rocks that could damage the filter blanket.

### **PSDK 3.1.6 Wire And Polymer Coating (New Sub Clause)**

New Sub-Clause:

The wire used for the fabrication of wire mesh cages for gabions or mattresses and for lacing and bracing operations shall be plain mild steel wire with external zinc aluminium(5%Al) coating and where required, with UV resistant Polymer coating.

Mild steel wire for gabion baskets shall be a minimum of 2.7mm thick before coating is applied.

Mild steel wire for mattress baskets shall be a minimum of 2.2mm thick before coating is applied.

It shall be capable of resisting effects of natural weather exposure, immersion in saltwater and not show any material difference in its initial characteristics over an extended period of time.

## **PSDK 3.2 PITCHING**

### **PSDK 3.2.1 Stone**

In Table 2, Column 2 for Extra heavy: delete "300" and replace with "500".

## **PSDK 5 CONSTRUCTION**

### **PSDK 5.2.3 Assembly**

Add to the Sub-Clause:

All cages shall be connected to adjacent cages by lacing the adjacent edges together with 2,7mm dia. coated wire. The lacing shall be in accordance with Sub-Clause 5.1.2.

All wire shall comply to the manufacturer's specifications and quality standards and the supplier of the cages' specification requirements.

#### **PSDK 5.2.4 Rock Filling**

Add to Sub-Clause:

Particular care shall be taken in the filling of gabions so as to ensure that the voids in the rockfill are reduced to the minimum which can be reasonably achieved. In order to minimise the voids in the rock filling, the filling shall proceed in layers not exceeding 300 mm deep and each layer shall be rodded and barred so as to compact the rockfill before filling of the next layer commences. Where appropriate, hand packing of selected rock particles shall be carried out.

Gabions and mattress cages are to be filled and packed in accordance to the manufacturers specifications and guidelines (In some cases soil fill may be required).

##### **PSDK 5.2.4.2 Mattresses used in Revetments and aprons**

Add to the Sub-clause:

Where gabions and mattresses are placed in exposed positions the rock particles forming the exposed faces shall be specially selected so as to present a fair and even surface.

#### **PSDK 5.3.4 Wired Pitching**

Add to the Sub-Clause:

The areas in which wired or grouted wire pitching is to be used will be indicated on site by the Engineer.

#### **PSDK 7 Tests**

Add to the Sub-Clause:

The Contractor is to provide proof of materials testing as described in the specification. An item has been allowed for additional testing should this be deemed necessary by the Engineer.

#### **PSDK 8 MEASUREMENT AND PAYMENT**

##### **PSDK 8.2.2 Gabions**

Delete the 2<sup>nd</sup> and 3<sup>rd</sup> sentence and replace with:

The unit of measurement shall be the cubic metre of the rock-filled cages. Where specified for Terramesh (or similar approved) the unit will be the cubic metre of imported rock or soil filled gabion. The quantity shall be calculated from the dimensions of the gabions indicated on the drawings, Bill of Quantities or prescribed by the Engineer, irrespective of any deformation or bulging of the completed gabions.

The Tendered rate shall include compensation for supplying all material, including rock or imported soil fill wire-mesh cages, Galfan coating or Galfan and Polymer coating as stated

in the Bill of Quantities , tying and connecting wires, loading, transporting and off-loading, the assembly and filling of cages, and any other work necessary for constructing the gabions.

### **PSDK 8.2.3 Extra Over Item 8.2.2 For Packing Selected Stone For Exposed Faces**

Add to the Sub-Clause:

The method of selecting and packing stone for exposed faces as scheduled, shall be as specified in Sub-Clause 5.2.7 - Special Finish.

### **PSDK 8.2.4 Geotextile Or Geomembrane**

Add to Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The geotextile type shall be AG 200 Geotextile

### **PSDK 8.2.8 Excavate Material For Gabions (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The tendered rate shall cover the cost of clearing, excavation, stockpiling, backfilling and compacting all material for gabions and to spoil the surplus material at the designated spoil site.

### **PSDK 8.2.9 Foundation Trench And Backfilling (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

The unit of measurement shall be cubic metre of excavation made in accordance with the authorized dimensions. The tendered rates shall include full compensation for excavating in each class of material, including unavoidable overbreak, trimming of trenches, compacting the trench inverts, backfilling and compacting the backfill, and the disposing of surplus excavated material at the designated spoil site

Foundation trenching and backfill in all classes of material, inclusive of spoil disposal at an approved spoil disposal site.

### **PSDK 8.2.10 Surface Preparation For Bedding The Gabions (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be square metre (m<sup>2</sup>).

The unit of measurement for levelling and preparing surfaces for receiving the gabion cages shall be the square metre to the neat dimensions for revetments, aprons or wall foundations. The tendered rate shall include full compensation for preparation, filling any cavities with rock and the levelling off the ground surface so as to be ready for receiving the gabion cages.

**PSDM EARTHWORKS (ROADS, SUB GRADE) (SABS 1200 DM – 1981)****PSDM 3 MATERIALS****PSDM 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES**

Amend this clause to be exactly as that described under clause PSD 3.1 of the Variations and Additions to the Standardised Specification for Earthworks (SABS 1200 D – 1988)

**PSDM 5 CONSTRUCTION****PSDM 5.1 PRECAUTIONS****PSDM 5.1.2 Accommodation Of Traffic**

Add to the Sub-Clause:

Traffic accommodation shall conform to the requirements of SANS 1921 and to any special clauses noted in this specification, where applicable.

**PSDM 5.2 METHODS AND PROCEDURES****PSDM 5.2.2.3(B) CUT TO SPOIL**

Delete Sub-Clause and replace with:

Spoil material is to be disposed of in accordance with the requirements of good environmental practises the EMP where applicable.

**PSDM 5.2.2.3(c) CUT TO FILL**

Add to Sub-Clause:

The order of excavating cuts shall be arranged to minimise the double handling of material. All road embankments shall be top soiled and rehabilitated.

**PSDM 5.2.3.2 Removal of unsuitable ground**

Replace the second sentence of paragraph (a) with the following:

The excavated spaces shall then be backfilled with approved imported natural gravel material compacted to 93% Mod: AASHTO density in layers not exceeding 150mm thickness.

Add the following sentence to paragraph (b):

Unsuitable material excavated will be paid for under cut to spoil.

**PSDM 5.2.4 Fill****PSDM 5.2.4.2 Placing and Compaction****PSDM 5.2.4.2(F)(1) COMPACTION**

Delete "90%" and replace with "93%".

**PSDM 5.2.4.3(E) TOPSOILING**

Delete "50mm" at the end of the first sentence and replace with "150mm".

### PSDM 5.2.5 Selected Layer

Replace the second sentence of this clause with the following:

Sand shall not be used for the upper (G6) selected layer. Both the G6 and G8 selected layers shall be compacted to a lower specification limit (Ls) value of 95% and 93 % respectively of Mod. AASHTO density where gravel material is used. Where sand is used for the lower (G9) selected layer it shall be compacted to an Ls value of 100% of Mod. AASHTO density.

### PSDM 5.2.8 Transport

Delete Sub Clause PSDM 5.2.8.1 and PSDM 5.2.8.2 and replace with:

All haulage shall be taken as free haul. No overhaul shall be paid under this contract.

## PSDM 7.2 PROCESS CONTROL

Replace Table 1 with the following table:

**TABLE PSDM 1- TESTING FREQUENCY**

1	2	3	4
Test	Position in layer	Testing Frequency	
		Area or Volume to which one test is applied, max.	Number of tests per lot, min.
Density	Fill	250m <sup>3</sup>	4
	Top 300mm of fill and road bed	750m <sup>2</sup>	4
	Selected layer and gravel surface layer	500m <sup>2</sup>	6
Indicator	Top 300mm of fill and road bed	750m <sup>2</sup>	1
	Selected layer and gravel surface layer	500m <sup>2</sup>	1
CBR	Top 300mm of fill and road bed	500m <sup>2</sup>	1
	Selected layer and gravel surface layer	500m <sup>2</sup>	1

## PSDM 7.3 ROUTINE INSPECTION AND TESTING

### PSDM 7.3.2 Routine Inspection And Testing

Delete Sub-Clause and replace with:

All measurements and test results shall be assessed in accordance with Clause 7.3.3 of SABS 1200M : 1996 Roads (General), Appendix B: Statistical Judgement Plan .

Amend Table B.5 of SABS 1200M: 1996 as follows:

1	2	3	4	5	6
Material	Properties	Min.Sampl e Size (n)	Lower Spec. Limit (Ls)	Upper Spec. Limit (Ls')	Ø (%)
Fill (other sand)	Relative Compaction	4	93%	-	15
Fill (sand)	Relative Compaction	4	100%	-	15

<b>Selected Layers (G7 and lower G9 gravel material)</b>	Relative Compaction	6	93%	-	15
<b>Selected Layers G10</b>	Relative Compaction	6	90%	-	15

Add the following to Sub-Clause:

Sand shall be defined as material with a 0,075mm fraction less than 20% and shall be non-plastic (cohesionless).

All testing required for trench layerworks and fill under roads shall comply with PSDM 7.

## **PSDM 8 MEASUREMENT AND PAYMENT**

### **PSDM 8.3.3 Treatment Of Road Bed**

#### **PSDM 8.3.3(a) Road bed preparation and compaction of material to:**

Delete points 1 to 3 and replace with:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

- 1) a minimum of 93% of Modified AASHTO maximum dry density
- 2) a minimum of 95% of Modified AASHTO maximum dry density
- 3) a minimum of 100% of Modified AASHTO maximum dry density

### **PSDM 8.3.4 Cut To Fill, Borrow To Fill**

Replace the heading and contents of this Sub-Clause with the following new Sub-Clauses:

#### **PSDM 8.3.4(a) Cut to fill (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

- i) Compact to a minimum of 90% of Modified AASHTO maximum dry density.
- ii) Compact to a minimum of 93% of Modified AASHTO maximum dry density.
- iii) Compact to a minimum of 100% of Modified AASHTO maximum dry density.

The unit of measurement shall be the cubic metre of fill and the volume will be calculated in accordance with the authorised dimensions of the embankment and levelled cross sections.

The tendered rate shall include full compensation for the cost of excavating the material in the road prism as if in soft material, for transporting, preparing, processing, shaping (including forming side channels and benching where applicable), watering, mixing, compacting to the specified density, and for finishing the slopes of cuts and fills complete as shown on the drawings.

Sub item (ii) above will only be paid where the material being processed is a non-cohesive sandy material and where the additional compactive effort is ordered by the Engineer in writing.

### **PSDM 8.3.4(b) Borrow or Stockpile to fill from off site, pipe trench or commercial sources (New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m<sup>3</sup>).

- i) Compact to a minimum of 90% of Modified AASHTO maximum dry density
- ii) Compact to a minimum of 93% of Modified AASHTO maximum dry density
- iii) Compact to a minimum of 100% of Modified AASHTO maximum dry density

The unit of measurement shall be the cubic metre of fill and the volume will be calculated in accordance with the authorised dimensions of the embankment and levelled cross sections.

The tendered rate shall include full compensation for the cost of procuring, furnishing, transporting, placing, processing, shaping (including forming side channels and benching where applicable), watering, mixing, compacting to the specified density, and for finishing the slopes of cuts and fills complete as shown on the drawings.

Sub item (ii) above will only be paid where the material being processed is a non-cohesive sandy material and where the additional compactive effort is ordered by the Engineer in writing.

### **PSDM 8.3.5 Selected Layer Compacted To 93% MOD AASHTO Density (New Sub Clause)**

Add new Sub-Clause:

#### **a) Selected layer (G7 quality material) for roads:**

- |   |          |
|---|----------|
| i) From commercial source (Provisional) | Unit: m3 |
| ii) From cut                            | Unit: m3 |
| iii) From stockpile                     | Unit: m3 |

#### **b) Selected layer (G8 quality material) for roads:**

- |   |          |
|---|----------|
| i) From commercial source (Provisional) | Unit: m3 |
| ii) From cut                            | Unit: m3 |
| iii) From stockpile                     | Unit: m3 |

#### **c) Selected layer (G9 quality material) for roads:**

- |   |          |
|---|----------|
| i) From commercial source (Provisional) | Unit: m3 |
| ii) From cut                            | Unit: m3 |
| iii) From stockpile                     | Unit: m3 |

The unit of measurement shall be the cubic metre and the quantity shall be calculated from the authorised dimensions of the compacted layer."

The tendered rates shall include full compensation for excavating the material, loading, transpiling, offloading, spreading, watering, mixing, breaking down, compacting the layer and trimming in terms of Sub-Clause 5.2.4.3(d) and Clause PSD 8.3.6. Should the material be sand, as permitted under item PSDM 5.2.5, compaction is to be increased to 100% Mod. AASHTO density, the additional compaction required shall be deemed to be included in the above rates.

The above items shall also include the requirements of Sub-Clause PSD 5.2.2.2.

**PSDM 8.3.7 Cut To Spoil Or Stockpile From**

The unit of measurement shall be cubic metre (m<sup>3</sup>).

Add to Sub-Clause:

- i) Undercut below formation
- ii) Excess topsoil
- iii) Removal of unsuitable (soft) material in restricted areas (undercut)

Reinstatement of undercut area in iii) above shall be paid according to payment item PSDM 8.3.4.

**PSDM 8.3.12 Overhaul**

The freehaul distance for this contract is unlimited. Contractors are to note that no overhaul will be paid.

**PSDM 8.3.17 Construction Of New To Existing Road Joint ( New Sub Clause)**

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measurement shall be the linear metre and the quantity shall be calculated from the net finished surface of the road. The new to existing road joint shall be constructed over the full depth of construction, from the top of the wearing-surface to the bottom of the lowest selected subgrade layer.

The tendered rate shall include for all labour, plant and material required to construct the new to existing road joint including cutting back and removing the existing road layers to the required width and depth as shown on the project drawings. The benching in the joint shall be formed prior to the new layerworks construction commences. The rate shall include for disposing of all unsuitable/surplus material. It should be noted that saw cutting, removing and disposing of the asphalt surfacing will be paid under PSC 8.2.11 & PSC 8.2.14."

**PSG CONCRETE STRUCTURAL (SABS 1200 G – 1982)****PSG 2 INTERPRETATIONS****PSG 2.1 SUPPORTING SPECIFICATIONS**

Add the following:

SANS 50197-1 or EN 197-1

SANS 1491 Part I: Ground granulated blast furnace slag (GGBS)

SANS 1491 Part II: Pulverised Fly Ash (PFA)

SANS 1491 Part III: Condensed Silica Fume (CSF)

**PSG 2.3 a) General**

Adverse weather

Delete the figure “25°C” and replace with “30°C”

**PSG 3 MATERIALS****PSG 3.1 APPROVAL OF MATERIALS**

Add the following:

If during the progress of the work, the contractor desires to use materials of proportions other than those originally approved, or if in the opinion of the Employer's Agent or their representative, the materials from the sources originally approved change in characteristics, he shall provide evidence satisfactory to the Employer's Agent that the new materials and/or new combination of materials will produce concrete meeting the requirements of the specification and will not bring about unacceptable changes in the appearance or other characteristics of the structure.

When any changes are made in terms of this subclause, they shall be made at the contractor's expense, and no extra payment will be allowed by reason of such change.

**PSG 3.2 CEMENT****PSG 3.2.1 Applicable Specifications**

Replace with the following:

No Ordinary Portland Cement having an equivalent sodium monoxide content (calculated as  $\text{Na}_2\text{O} + 0.658 \text{ K}_2\text{O}$ ) exceeding 0.6% by mass of the cement may be used in any reinforced concrete other than in combination with an approved coarse aggregate, which has been shown by testing to be non-reactive in respect of potential alkali-aggregate reaction.

Cementitious binders shall, unless otherwise specified, be common cements that comply with SANS 50197-1 or be blends of certain common cements and extenders that comply with SANS 1491-1, SANS 1491-2 or SANS 1491-3,

Ground granulated blast furnace slag (GGBS) used on the Works shall be from a source to be approved by the Employer's Agent and shall comply with the requirements of SANS 1491 Part I, as amended.

The type of cement to be used in any concrete element shall take into account the environmental conditions and durability requirements at the location of the site of the works and shall be approved by the Employer's Agent.

**PSG 3.2.2. Alternative Types of Cement**

Pulverised Fly Ash (PFA) used on the Works shall be from a source to be approved by the Employer's Agent and shall comply with the requirements of SANS 1491 Part II, as amended.

Condensed Silica Fume (CSF) used on the Works shall be from a source to be approved by the Employer's Agent and shall comply with the requirements of SANS 1491 Part III, as amended.

The minimum content of cementitious material shall be not less than 325kg and not more than 400kg per cubic metre of concrete for ordinary Portland Cement or not more than 450kg per cubic meter when cements containing ground granulated blast furnace slagment of Pulverised Fly Ash is used.

**PSG 3.2.3. Storage of Cement**

Add the following:

No cement shall be stored on the site for a longer period than 28 days. After this period the Employer's Agent may call for tests to be carried out in accordance with SANS 50197-1 and 2 and if the cement complies it may be used. Cement, if not delivered in bulk for storage in an approved silo, must be stored in a separate room with a raised floor constructed of heavy planks supported on bricks, or similar. This room must be completely damp-proof and well ventilated. The cement sacks shall be closely stocked, not more than 12 sacks high, and shall not be stacked against the walls. The arrangements of stacking shall be such as to facilitate the cement being used in the same order in which it is received. Lumpy cement, broken pockets and sweepings shall not be used. Any bags of cement that show any degree of hydration or setting shall be removed from the site and replaced at the Contractor's expense.

**PSG 3.3 WATER**

Add the following:

Water shall be obtained from the city water supply where possible and shall be taken from any other source only on the approval of the Employer's Agent. Where there is reason to suspect the presence of harmful impurities, the Employer's Agent may require the contractor to submit the results of approved tests.

Water for curing of concrete shall not contain impurities in sufficient amount to cause discoloration of the concrete or produce etching of the surface.

No sea water or water containing salts shall be used.

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 shall comply to SANS 51008.

**PSG 3.4 AGGREGATES****PSG 3.4.1 Applicable Specification**

Replace the entire contents of the clause with the following:

- a) Both the fine and coarse aggregate shall comply with the relevant requirements of SANS 1083.

The nominal coarse aggregate size in the structural concrete shall be in accordance with the specified class of concrete for each portion of the works.

Water demand of sand:

Sand with a water requirement in excess of 200ℓ /m³ when made up into concrete with the intended mix proportions (including admixtures, if any) will not be allowed.

The drying shrinkage of both the fine and coarse aggregate, when tested in accordance with SANS 5836, shall not exceed the following limits:

For use in prestressed concrete, concrete bridge decks, slender columns and water retaining structures, the shrinkage of both fine and coarse aggregate shall not exceed 130% of that of the reference aggregate.

For use in other reinforced concrete members, the shrinkage of the fine aggregate shall not exceed 175% of that of the reference aggregate and the shrinkage of the coarse aggregate shall not exceed 150% of that of the reference aggregate.

For use in mass concrete substructures and unreinforced concrete head walls and wing walls, the shrinkage of both the fine and coarse aggregate shall not exceed 200% of that of the reference aggregate.

The drying shrinkage of concrete shall not exceed 0.040%, when tested in accordance with the requirements of SANS 6085.

### **PSG 3.4.2 Use of Plumbs**

#### ***PSG 3.4.2 (g) Add new sub-clause:***

The use of plumbs will not be permitted in any of the strength concrete specified on the Works.

### **PSG 3.4.4 Aggregate Quality**

Add New Sub-Clause:

Records of grading analysis tests on all the aggregate shall be kept.

Fine aggregate must be clean, naturally occurring, siliceous sand or approved crushed rock. The broken shell content determined in accordance with SANS Method 5840 must not exceed 30% by mass.

In addition, for water retaining structures the following shall apply: fine aggregate grading is to comply with the table below. It may be necessary to blend two sands in order to meet the grading envelope.

The maximum variance of the fineness modulus (FM) of the fine aggregate shall not exceed 0.2. Revision to the submitted mix design must be carried out where this becomes unavoidable.

<b>Sieve size (mm)</b>	<b>% passing</b>
4.75	90-100
2.36	75-100
1.18	60-96
0.60	40-60
0.30	20-40
0.15	10-20
0.075	5-10 (5-20) *

\* If crusher sand

The coarse aggregate shall all be retained on a screen with 4,75mm nominal aperture size with the exception of dust content, which shall not exceed 0.5% by mass. Flakiness indices determined in accordance with SANS Method 5847 must not exceed 30% in the case of 26.5mm aggregate size and 25% in the case of 19.0mm aggregate size respectively.

### **PSG 3.5 ADMIXTURES**

#### **PSG 3.5.1 Approval of Admixtures Required**

Add the following:

Admixtures may be used with the approval of the Employer's Agent in the design of concrete mixes to modify the properties of the plastic concrete.

The use of admixtures, which have a retarding effect on the rate of hydration of the cement, may not be used when the concrete temperatures are below 20°C.

A retarding admixture shall be used if the temperature of concrete mixes using cements of strength class 42.5 or higher is between 20°C to 30°C or where the ambient temperature is between 20°C to 30°C.

Admixtures containing chlorides shall not be used.

The Contractor must provide the following information for the approval of the Employer's Agent:

- The trade name of the admixture, its source and the manufacturer's recommended method of use
- Typical dosage rates and possible detrimental effects of under-dosage or over-dosage.
- The method and accuracy of dispensing the admixture.

All admixtures for concrete shall comply with the requirements of SANS 50934, ASTM C260 or AASHTO M194.

## **PSG 4 PLANT**

### **PSG 4.1 GENERAL**

Add the following:

When considered necessary by the Employer's Agent, stand-by equipment shall be available at short notice.

### **PSG 4.2 BATCHING PLANT**

Add to the Sub-Clause:

Reports on the calibration of weight batching plant, clearly stating the date of the test, shall be submitted to the Employer's Agent.

In addition, when concrete is being mixed for water retaining structures the following shall apply:

The batching of concrete shall be done by weigh batching only, volume batching will not be permitted.

The Contractor shall ensure, by regular examination, calibration and tests, that the batching system functions efficiently and accurately, and that hoppers and cement containers are kept dry and clean. Proof of examination and calibration, clearly stating date of test shall be submitted to the Employer's Agent.

No mixed concrete shall be deposited directly onto the ground prior to placing. A board or other suitable platform is to be provided onto which the mixed concrete can be deposited whilst it awaits placing.

Excess concrete from mixing shall be deposited in a designated area awaiting removal to an approved landfill site, or for use in the reservoir embankment.

The Contractor will contain wash water from cement mixing operations, by directing the water into a sump for collection. The material contained in the sump will be removed to an appropriate landfill site or included in the reservoir embankment.

## **PSG 4.5 FORMWORK AND FALSEWORK**

### **PSG 4.5.1 Design**

Add the following:

The design of the formwork and falsework shall be the responsibility of the Contractor and shall be designed and detailed by a registered professional engineer, if required by the

special conditions of contract, and submitted for approval by the engineer. All joints shall be either horizontal or vertical.

The formwork shall be designed to limit deflection to a value not exceeding 1/360th of the span between supports.

Chamfer strips 25mm x 25mm shall be provided on all exposed edges.

The design of all proposed formwork and falsework shall be subject to the approval of the Employer's Agent. Such approval shall in no way relieve the Contractor of their responsibility under the contract.

### **PSG 4.5.3 Ties**

Add to the Sub-Clause:

The spacing and method of fixing shutters and filling of voids shall be subject to the approval of the Employer's Agent.

For water-retaining structures:

- (a) If sacrificial metal ties are used, they are to be drilled out so as not to extend beyond 60mm of concrete surface on the wet side of the wall and 50mm on the outside.
- (b) If plastic sheaths are used to permit removal of the metal ties, the sheaths are to be removed and the holes are to be completely removed by using an oversized drill bit to ream out the holes.
- (c) The surface of the hole is to be primed by wetting with a cement/SBR latex slurry and the hole filled by caulking with a cementitious mortar consisting of 1 part cement to 2 parts concrete sand by volume, well mixed with sufficient clean water to obtain the required consistency. The grout is to be well rodded into the hole to completely fill same and provide a dense void free plug. The surface is to be trowelled to finish flush with the surrounding area. The procedure shall be proven by the Contractor submitting a sample completed hole of each type for approval which shall then be regarded as the minimum acceptable standard for all other holes.

## **PSG 5 CONSTRUCTION**

### **PSG 5.1 REINFORCEMENT**

#### **PSG 5.1.1 Bending**

##### ***PSG 5.1.1.4 Welding of Mild Steel***

Add the following:

All welding of mild steel, where permitted, shall be in accordance with BS 5135.

#### **PSG 5.1.2 Fixing**

Add the following:

All reinforcement placed in structures within 5km of the sea should be washed with clean, fresh water after placement in the formwork and not longer than 24 hours prior to the casting of concrete.

The placing of bars on fresh layers of concrete, as work progresses will not be permitted. No concrete shall be placed until the Employer's Agent or their representative has stated that he is satisfied that the reinforcement is correctly positioned as shown on the drawings.

#### **PSG 5.1.3 Cover**

Replace clause 5.1.3 with the following:

All concrete cover blocks used shall be of semi-spherical shape. The concrete cover blocks used shall have the same characteristic 28-day compressive strength as that specified for the respective structural concrete elements. Cover blocks shall not be less than 7 days old

at time of installation and shall have been cured by full immersion in water for a period of not less than 3 days.

Binding wire used for fixing reinforcement must be tightly bound around the nodes at bar intersection with cut ends bent inwards. A nominal reduction of the minimum specified cover by 3mm will be allowed for binding wire. The reinforcing tie wire used in the manufacture of the cover blocks shall be hot dip galvanised. Great care is to be taken over the manufacturing of these blocks and the Contractor must ensure that when the blocks are made, the tie wires are not pushed too deep into the blocks. A minimum cover of 30mm must be maintained between the reinforcing tie wire and the conical end of the block.

**The minimum cover shall be as specified on the drawings.**

**For chambers minimum cover is to be 40mm.**

## **PSG 5.2 FORMWORK**

The surface of the floor, the internal upper surface of all footings and the upper surface of the roof and the slabs over the valve chamber shall be finished in accordance with clause PSG 5.2.1.1 class 4 – Steel Float Finish.

The surface of the blinding layer shall be finished in accordance with clause PSG 5.2.1.1 Class 3 – Wood Float Finish

All exposed internal and external surfaces of pump station to be finished in accordance with clause PSG 5.2.1 Class 2 – rubbed finish.

The internal surfaces of all walls, columns and the underside of the roof and all exposed surfaces shall be finished in accordance with clause PSG 5.2.1 class 3a – Smooth Finish.

All surfaces in contact with backfill material may be finished in accordance with clause PSG 5.2.1 class 1 – Ordinary Surface Finish.

### **PSG 5.2.1 Classification of Finishes**

Replace the entire Clause with the following:

Surface finishes to formed concrete faces shall be classified as hereunder –

Class 1: ordinary finish;

Class 2: rubbed finish;

Class 3: off the form finishes;

- (a) smooth finishes,
- (b) board marked finishes,
- (c) special patterned finishes,

Class 4: exposed aggregate finishes;

- (a) brushed and washed finishes,
- (b) tooled finishes,
- (c) sand blasted finish
- (d) aggregate transfer finishes,

Class 5: applied finishes;

- (a) rendered finishes,
- (b) painted finishes.

#### **Class 1 – Ordinary Surface Finish**

This is the finish left on a concrete surface after the removal of the forms and the filling of all holes left by shuttering bolts and the repairs of all defects. The surface shall be true and even, free from stone pockets, depressions and projections.

## **Class 2 – Rubbed Finish**

Immediately after removal of the shuttering all defects shall be made good and the rubbed finish shall be applied within three days as follows:

Before starting this work, the concrete shall be kept thoroughly saturated with water for a minimum period of 3 hours. Sufficient time shall have elapsed before the wetting down to allow the mortar used in the pointing of the bolt holes and defects to set properly. Surfaces to be finished shall be rubbed with a medium-coarse carborundum stone, using a small amount of mortar on its face. The mortar shall consist of cement and fine sand mixed in the proportions used in the concrete being finished. Rubbing shall be continued until all projections and irregularities have been removed, all voids filled, and a uniform surface has been obtained. The paste produced by this rubbing shall be left in place for at least five days. The surface shall be smoothed by being rubbed lightly with a fine carborundum stone.

## **Class 3 – Off the Form Finishes**

Off the form finishes require a very high standard in concrete quality, formwork and technique. The intention is that no after treatment other than treatment of boltholes (which should be placed with regulatory and precision) should be required. Forms shall be unblemished and panels regular. Joints shall be a feature of the pattern and shall be handled with care. Reinforcement cover blocks shall be of semi-spherical shape to minimise their appearance on the finished surface.

- b) Smooth finishes may be obtained from non-absorptive linings to forms, form plywood, shutter board, or plastic faced board in new condition.

Board marked finishes shall be obtained from the use of timber planks, which shall be dressed and thickened unless otherwise specified. When un-planed timber is specified, boards with a strong grain shall be mixed with boards with a less pronounced grain and not grouped together. The Employer's Agent shall indicate if all boards are not to be horizontal and a patterned panel effect is required.

Special patterned finishes are required to reflect without blemish the surface of patterned hardboard, rubber, thermoplastic or other lining as specified.

## **Class 4 – Exposed Aggregate Finishes**

The purpose of these finishes is to relieve the uniform colour and texture of the concrete by exposing the aggregate, which shall be the normal size concrete aggregate except where otherwise specified. Attention is directed to the necessity for allowing for the material to be removed and ensuring that the requisite cover to reinforcement is maintained.

- c) Brushed and washed finishes are obtained by stripping and scrubbing the concrete surface with a stiff wire brush. Unless forms can be stripped at a very early age (approximately 16 hours at 20°C) this method cannot be used unless the formwork has been treated with a retarding agent. Care shall be taken to ensure that concrete is not deposited against the face of treated forms, which should be stripped as early as possible. Where scrubbing with water is not effective, a solution of hydrochloric acid in the proportion of 1 part of acid to 4 parts of water shall be thoroughly and evenly scrubbed into the surface until the desired texture is obtained. The complete surface shall then be neutralised by washing thoroughly with water to which a small amount of ammonia has been added. When acid is used, special precautions shall be taken to protect workmen, underlying materials and persons passing.

Tooled finishes may be carried out by the use of bush-hammers, light mechanical chisels or other approved tools, preferably mechanically operated. No tooling shall be done until the concrete has attained an age of at least 14 days after casting when normal Portland cement has been used and 7 days when rapid hardening cement has been used, or longer as may be necessary to prevent the aggregate particles from being dislodged.

The final finish shall show a surface of evenly distributed coarse aggregate particles set in a matrix of mortar, each aggregate particle being in slight relief. After the tooling has been completed, the surface so treated shall be scrubbed down with a stiff brush and washed with water.

Sand blasted finishes shall be obtained by sand blasting the thoroughly cured concrete surface of the same ages as given under (b) Tooled Finishes with hard sharp sand to produce an even, fine, clean surface in which the mortar has been cut away, leaving the coarse aggregate exposed.

Aggregate transfer finishes may be affected by sticking a single layer of selected aggregate onto plyboard or other suitable form liners which have been cut to size and coated with a layer of water-soluble cellulose adhesive mixed with plaster sand. This layer should be just thinner than half the average least dimension of the aggregate. When the glue is set the liners are placed in the forms which are then concreted, care being taken to protect the forms when placing and compacting. Liners shall be stripped after at least 3 days and the adhesive and sand covering the aggregate removed by scrubbing and washing.

### **Class 5 – Applied Finishes**

It is essential that all surfaces on which applied finishes are to be used shall be sound, clean and free of mould oil.

Defects shall first be made good.

- d) Rendered finishes require a good key. Unless otherwise specified this may be provided by flicking on to the previously soaked and still moist surface of 1 part cement to 2 parts of sharp sand. This shall be left untouched apart from curing.

The render coat shall consist of 1 part Portland cement, or Portland cement 15, ½ part slaked lime, 4 to 4½ parts of sand by volume and shall not be less than 5mm or more than 16mm in thickness.

If a second coat is required because of the irregularity of the concrete. The surface of the first coat shall be combed with uniform wavy lines to provide a key after it has begun to harden. The second coat may be applied the next day. If a scraped finish is specified the rendering shall be lightly scraped to achieve the desired effect with an old tenon saw blade or similar implement, after it has attained a biscuit like crispness. It shall then be lightly brushed and washed to remove loose particles.

All rendered finishes shall be cured.

Painted finishes of the type specified shall be applied strictly in accordance with the paint manufacturer's instructions. Very smooth surfaces shall be acid washed, lightly sand blasted or rubbed with abrasive stones before being painted. Painting shall be delayed as long as possible and two coats applied unless otherwise specified.

### **PSG 5.2.1.1 Concrete Upper Surface Finishes**

Classification

Surface finishes to exposed (non-formed) concrete faces shall be classified as hereunder:

- Class 1 – screeded finish
- Class 2 – broomed finish
- Class 3 – wood float finish
- Class 4 – steel trowel finish

#### **Class 1 – Screeded Finish**

Immediately after placing, the concrete shall be screeded with a true edged wooden board working between forms or other guides set accurately to line and level. No mortar shall be added, and noticeable surface irregularities caused by the displacement of coarse aggregate shall be made good by re-screeding after removing or tamping down the interfering aggregate.

#### **Class 2 – Broomed Finish**

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be broomed with a stiff broom or brush to

expose the aggregate. Dust and loose particles shall be gently washed away once the desired relief has been obtained.

### Class 3 – Wood Float Finish

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be brought to a smooth and even finish using a wood float and including any additional 4:1 sand and cement as necessary.

### Class 4 – Steel Float Finish

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be brought to a smooth and even finish using a steel float and including any additional 4:1 sand and cement as necessary.

## PSG 5.2.2 Preparation of Formwork

Add the following:

Shutter release oil or any other contaminants will not be permitted on any of the reinforcing steel.

Wedges and clamps shall be used in preference to nails for securing the form components and wire ties or tie bolts in reinforced concrete must be capable of complete removal after use, except as otherwise specified. Where oil is used it shall be applied before any reinforcement is placed in position.

## PSG 5.2.5 Removal of Formwork

### PSG 5.2.5.2 Replace the Entire Contents with the Following:

Where test cubes to determine stripping times are not made, the minimum periods, which shall elapse between the time of the placing of the concrete and the time of removal of the forms shall, unless otherwise agreed with the Employer's Agent, be in accordance with the table hereunder, where each day covers a full 24 hour period.

Minimum stripping time in days:

	CEM I	CEM I	CEM II/A & CEM II/ B (MAX 29% EXTENDER)	CEM II/A & CEM II/ B (MAX 29% EXTENDER)	CEMII/B (30-35% EXTENDER)	CEMII/B (30-35% EXTENDER)
TYPE OF STRUCTURAL MEMBER OR FORMWORK	Normal weather (Above 15° C) *	Cold weather (Below 5° C) *	Normal weather (Above 15° C) *	Cold weather (Below 5° C) *	Normal weather (Above 15° C) *	Cold weather (Below 5° C) *
Beam sides, wall or unloaded cols	1	2	2	4	2	6
Slabs, with props left underneath	4	7	5	8	6	10
Beam soffits, props left under	7	12	8	14	10	17
Removal of slab props	10	17	10	17	12	21
Removal of beam props	14	21	14	21	18	28

\*Average daily temperature of the atmosphere adjacent to the concrete as measured by a maximum and minimum thermometer. When the average daily temperature is between 5°C and 15°C the minimum stripping times shall be interpolated from the table.

The table assumes that the member concerned is not subjected to any heavy construction loads and that the total force to be supported is not more than half the design load. Where heavier loads are to be carried, no stripping of soffits shall be permitted until the concrete has attained its full strength. Any days during which the average temperature was below 2°C shall be completely disregarded.

In the case of walls and columns the stripping times shall be determined by means of cube test results in the first instance, so as to ensure that no damage is caused to the structures by removing formwork.

***PSG 5.2.5.6 Thermal Shock and Thermal Contraction Cracking***

When it is possible that a temperature differential of 20°C or more may exist within the concrete or between the concrete surface and its surroundings, special precautions shall be taken by the Contractor to avoid thermal shock or thermal contraction cracking.

In order to minimize and control cracking that may result from temperature changes in the structure it is desirable that the contractor see the advice of specialists in the field of concrete technology and their recommendations regarding the control of cracking be implemented within the guidelines provided in the specification.

**PSG 5.3 HOLES, CHASES AND FIXING BLOCKS**

Add to the Sub-Clause:

Fixing blocks for the attachment of fixtures may be embedded in concrete provided that the strength or any other desirable feature (such as appearance) is not in the opinion of the Employer's Agent, thereby impaired.

**PSG 5.4 PIPES AND CONDUITS**

Add the following:

The clear space between pipes of any kind embedded in reinforced concrete and the clear space between such pipes and reinforcement shall not at any point be less than 40mm, or 5mm plus the maximum size of coarse aggregate, whichever is the greater.

The puddle flanged inlet, outlet, drainage and scour pipes shall be fixed in line and position under and in the walls by the Contractor as shown on the drawings. All pipework shall be cast into walls at the time of pouring.

The use of "windows/ box outs" to cast in pipework at a later date shall not be permitted for cast in items.

**PSG 5.5 CONCRETE**

**PSG 5.5.1 Quality**

***PSG 5.5.1.1 General***

Add to G 5.5.1.1

The concrete shall also comply with the requirements for Durability stated in PSG 7.3.8

***PSG 5.5.1.4 Chloride Content***

Replace the entire contents of the clause with:

The chloride content, measured as Cl<sup>-</sup>, of all concrete in the structure as measured by BS 1881:124:1988 shall not exceed 0.2% mass cementitious binder.

The maximum chloride content of fine aggregate shall be 0.2% by mass as Cl<sup>-</sup> as measured by SANS 202:2006

***PSG 5.5.1.5 Durability***

Add to the Sub-Clause:

The exposure conditions at the site of the Works are to be considered as being severe

**PSG 5.5.1.6 Prescribed Mix Concrete**

Delete the Sub-Clause and substitute the following:

Unless the Design mix is detailed on the drawings or in the Specification, all concrete shall be Strength concrete.

**PSG 5.5.1.7 Strength Concrete**

Add to G 5.5.1.7

Unless otherwise agreed to by the Employer's Agent, the concrete mix is to be designed by an approved laboratory.

At least four weeks before placing any concrete on the Works, the Contractor shall supply and deliver to the approved laboratory, at their own cost, samples of the aggregates he proposes to use in the concrete mix

The minimum content of combined cementitious material shall not be less than 325kg/m<sup>3</sup> and the maximum water/cement ratio shall be 0.5. The Contractor shall also submit for approval the proposed slumps and the proportions in which he proposes to use the materials for each grade of concrete in each type of construction.

In addition, the Contractor shall state the minimum cement / water ratio in terms of total water in the mix for each grade of concrete, and the use of any admixtures.

No structural concrete shall be placed on the job until the contractor has satisfied the Employer's Agent as to the suitability of the mixes concerned.

The laboratory will be bound by the requirements of this Specification which are to guide the Contractor in pricing the grade of strength concrete. The Contractor is to allow in their rate for strength concrete an amount to cover the fees and charges levied by the approved laboratory in designing the strength concrete mix.

Add:

**PSG 5.5.1.8 Bleeding**

Concrete shall be so proportioned, and materials so selected that bleeding is kept below 0.30mm/cm<sup>2</sup> as measured by the ASTM C232 – 99 tests.

Add:

**PSG 5.5.1.9 Shrinkage**

The drying shrinkage of concrete shall not exceed 0.040%, when tested in accordance with the requirements of SANS 6085.

Add:

**PSG.5.5.1.10 Temperature and Hydration of Concrete**

The temperature of the concrete shall be measured when it is delivered to site from a batch plant or a concrete supplier and shall be within the range 10°C and 30°C. Concrete which has a temperature outside of that range shall not be placed in the structure.

If slump loss occurs more than two hours after mixing, the concrete shall be rejected.

Care must also be taken not to cast concrete onto hot steel shutters as this might induce cracking.

The rate of hydration of the cement in the concrete shall be such that the concrete can be placed and properly compacted, 2 hours after the addition of water to the mix even in hot weather. Conversely, the initial set of the concrete must not be unduly delayed by low temperature, inappropriate use of admixtures or cement type, so that bleeding is promoted.

Add:

**PSG 5.5.1.11 No Fines Concrete**

Add new Sub-Clause:

No-Fines concrete shall be composed of cement and coarse aggregate only, the fine aggregate being omitted from the mix.

The stone shall comply with the grading requirements of 19mm single-sized crushed stone to table 7 of SANS 1083.

Only sufficient water shall be added to the mix to produce a smooth grout to completely cover each and every particle of aggregate.

Portions may be varied on site with the approval of the Employer's Agent to obtain a more satisfactory result. The upper surface of the no-fines is to be finished off with a wood float to provide a smooth working surface while adding just sufficient dry mix mortar (1:8) to close the upper surface of voids in order to prevent the ingress of foreign matter into the interstices.

No-Fines concrete shall be placed within 20 minutes of having been mixed and shall be rodded and hand tamped into position. The use of vibrators will not be permitted.

No traffic shall be permitted to traverse the surface of the no-fines concrete during the three days after placing and then only over planks or boards placed for that purpose.

**PSG 5.5.2 Batching*****PSG 5.5.2.1 No Site Blending of Cement Extenders will be Permitted.******PSG 5.5.2.2 Water***

Replace entire contents with the following:

Dependable equipment shall be provided for measuring the mixing water either by mass or by volume to an accuracy within 2%.

The accuracy of the measuring device provided shall be checked whenever required by the Employer's Agent or their representative by allowing it to discharge into vessels of accurately known capacity.

The total quantity of water allowed for shall include the free water present in the aggregates. The moisture content of the fine aggregate shall be determined at the beginning and halfway through each concreting shift, after showers of rain or at such other intervals as may be required by the Employer's Agent.

***PSG 5.5.2.3 Aggregates***

Replace entire contents with the following:

Each size of aggregate shall be measured separately by weighing to an accuracy of 3% except where other methods are authorised or ordered by the Employer's Agent.

Where suitable volumetric methods of measuring proportions of aggregates are permitted, these shall be checked at regular intervals, and shall take full account of bulking of the fine aggregate as delivered to the mixer. These methods shall be designed in such a manner that the consistency of the mix shall be as readily controlled as for mechanical batching.

All measuring devices shall be maintained in good order and condition, and no build-up of material on any part of the equipment shall be permitted.

**PSG 5.5.3 Mixing*****PSG 5.5.3.1 Mixing at Construction Site.***

Add the following:

Mixing shall continue until there is a uniform distribution of the materials and the mixture is uniform in colour. The minimum period of mixing shall be not less than that recommended by the manufacturers at the recommended speed and not more than 30 minutes. The entire contents of the mixer shall be removed from the drum before the materials for the succeeding batch are loaded.

Where hand mixing is permitted, the quantities of cement used shall be increased by not less than 10% over those determined for the appropriate mix design. The concrete shall be mixed on a clean and watertight platform.

### **PSG 5.5.3.2 Ready Mixed Concrete**

Add the following:

The concrete batching plant is to be inspected by the Employer's Agent for compliance with SANS 878 tolerances and their approval is to be obtained in writing before commencement of the concrete works.

A maximum delivery period of 90 minutes from the time water is added to the concrete mix to the actual discharge of concrete on site shall be permitted. The discharge period (including placing the concrete) shall not exceed 30 minutes.

The concrete slump of every truck shall be measured on delivery and shall comply with relevant parts of the SANS 878 specifications and this specification prior to any concrete from that truck is placed.

Where possible, dedicated truck drivers shall be used for the delivery of the concrete to site.

A detailed computer printout of the constituents of the concrete mix from the batching plant is to be handed over to and retained by the Employer's Agent's Representative on site on arrival (i.e. truck registration, mix proportions and the time water was added to the mix). The masses of the concrete constituents of each truck shall be checked against that of those submitted with the trial mix, subject to the batching accuracy as specified in SANS 878. The arrival time of each truck on site and the time that the concrete discharge is completed shall also be recorded by the Employer's Agent's Representative.

Before any ready-mixed concrete is used on the job, the contractor shall furnish the Employer's Agent with a copy of their letter to the suppliers in which he specified:

- (i) the type of cement;
- (ii) the nominal maximum size of aggregate;
- (iii) the cement / water ratio;
- (iv) the required compressive strength;
- (v) the required slump at the time and place of delivery; and
- (vi) the type of additive.

All these properties shall be as specified in the contract documents.

When required the Contractor shall satisfy the Employer's Agent that acceptable alternative means of supplying concrete have been arranged to be brought into operation in the event of disruption in the supply of concrete. In this connection, the Employer's Agent may require that the alternative means of supply shall commence if the disruption in the supply of ready-mixed concrete has lasted for an elapsed period in time of 1½ hours.

The use of ready-mixed concretes shall in no way relieve the contractor of any of their responsibilities for providing concrete complying with the specifications.

For grade 35/19 concrete, a CEM I or CEM II cement may be blended with pulverised fly ash (PFA) or ground granulated blast furnace slag (GGBS) and/or condensed silica fume (CSF), such that the combined cementitious material comprises not less than 60% cement clinker and a maximum of 40% of extender and/or other additional constituents by mass.

The minimum content of combined cementitious material shall not be less than 325kg/m<sup>3</sup> and the maximum water/cement ratio shall be 0.5.

The concrete mixes for the abovementioned grades of concrete shall be designed by an approved concrete design laboratory. At least four weeks before placing any structural concrete on the site, the Contractor shall supply and deliver to the laboratory, at their own cost, samples of the aggregates and the concrete mix design he proposes to use for the works. The Contractor shall include in their tender all fees and charges levied as well as all other costs incurred in designing the required strength concrete mix.

The contractor must submit the ready-mix suppliers concrete mix designs on a D2 Concrete Mix Design form for approval. The required backup documentation in the form of test results shall also be included and is to comply with SANS 1083. Failure to submit the required information will result in the rejection of the concrete mix. The contractor must allow sufficient time to receive the required information and submit to the Employer's Agent for approval.

#### **PSG 5.5.4 Transportation**

Add the following:

Containers for transporting concrete shall be cleaned of all hardened concrete and foreign material.

During transportation the concrete shall be protected from wind and sun; shall be prevented from drying out or losing moisture and shall not be subjected to excessive jarring or jolting. Drying out may be prevented by the provision of covers and / or other protective devices.

#### **PSG 5.5.5 Placing**

Add the following:

Where plums are permitted, they shall be deposited by hand.

Freshly placed concrete shall be protected from rain damage.

No concrete shall be placed if the air temperature in the shade is falling and is below 8°C or is rising and is below 5°C. Concreting shall not commence if the air temperature in the shade is above 35°C. The temperature of the concrete at the point of placing shall not exceed 30°C unless otherwise specified.

##### ***PSG 5.5.5.5 Dropping of Concrete (new heading)***

Add to the Sub-Clause:

Dropping concrete freely will only be permitted if the Employer's Agent is satisfied that this is the only practical method of placing.

##### ***PSG 5.5.5.9 Pumping of Concrete***

Delete the Sub-Clause and substitute the following:

The placing of concrete by pumping will not be permitted without the written approval of the Employer's Agent. The design concrete mix has to be approved by the Employer's Agent should pumping be allowed.

##### ***PSG 5.5.5.10 Blinding Layer (New Sub-Clause)***

Add new Sub-clause:

Beneath all structural grades of concrete, or where shown on drawings or elsewhere if so ordered by the Employer's Agent, the bottom of the excavation is to be covered by a blinding layer (screed) in Grade 15MPa concrete to a minimum depth of 75mm to prevent disturbance of the ground and to serve as an even, clean and accurately positioned working floor for setting steel and placing foundation concrete. This blinding layer shall be

laid within a day after excavations have been taken out, trimmed to the required depths and have been inspected and approved by the Employer's Agent.

Blinding concrete shall be measured per square metre and shall include for formwork and for a Wood Float Finish true to falls.

#### ***PSG 5.5.5.11 Continuous Pours***

Add new Sub-Clause:

In the case of continuous walls, these are to be cast in lifts of such height that each lift can be poured uninterrupted in one continuous operation over the entire perimeter of the wall. No vertical or inclined construction joints of any kind will be permitted in continuous walls unless they have been specifically ordered or authorized by the Employer's Agent.

The placing of concrete shall commence at convenient points on the perimeter of the wall and shall proceed both ways simultaneously so that fresh concrete meets fresh concrete. Any rest pauses, such as for meals, shall be avoided as far as possible, and the Contractor may be required by the Employer's Agent to make the operation continuous by working in shifts. A workable arrangement must be made before each concreting operation commences.

#### **PSG 5.5.6      Compaction**

Add:

##### **PSG 5.5.6.5**

If required by the Employer's Agent concrete shall be re-worked by re-vibration 1 to 3 ½ hours after placing. The time shall be decided by the Employer's Agent, taking cognisance of the mix, the ambient temperature and the workability of the concrete.

#### **PSG 5.5.7      Construction Joints**

##### ***PSG 5.5.7.1 Add the Following:***

Any additional construction joints required by the contractor shall be approved by the Employer's Agent. Where "off the form" finishes are specified, joints shall be arranged to coincide with the edges of boards or panels wherever possible.

Only those construction joints shown on the drawings shall be measured and paid for. The contractor shall allow in their pricing for any additional construction joints that he may require.

##### **PSG 5.5.7.3(B)**

Construction Joints when concrete is more than 24 hours but not more than 3 days old.

Delete and replace with the following:

The surface of the concrete shall be sandblasted or chipped with a light hammer, swept clean and thoroughly wetted. In addition, the first layer of concrete placed in walls over a depth of approximately 250mm shall be made richer by reducing the amount of coarse aggregate by 25%.

##### ***PSG 5.5.7.4 Preparation of Construction Joints (new heading)***

Add the following:

- e) All horizontal and vertical construction joints shall be cleaned of all dirt and loose particles and shall be prepared to the satisfaction of the Employer's Agent. Formed keys shall be provided if shown on the drawings or if instructed by the Employer's Agent. All intersections of construction joints with concrete surfaces which will be exposed to view shall be made straight and level or plumb and shall be constructed to the details shown on the drawings.

The Contractor is to provide a compressor (with oil traps) on site for the whole period during which concreting is in progress, and this must be available for cleaning concrete faces prior to placing fresh concrete or pouring joints. The cost of this plant and operation is to be allowed for in the Contractors rate for concrete.

“Blowing-off” may generally be carried out on horizontal surfaces but, under special circumstances approved by the Employer’s Agent, it may be carried out on vertical surfaces. The surface concrete to be prepared shall be between 4h and 8h old after completion of placing and shall be blown off using a mixture of air and water under a pressure of at least 500kPa or by using a high pressure water jet until all dirt, laitance, etc is removed and particles of clean coarse aggregate are exposed sufficiently to produce a rough surface. Any loose particles of coarse aggregate shall also be removed. The success of this method of preparation depends on selecting the correct time (dependant on the type of cement and atmospheric conditions) so that the concrete has set to just the necessary degree of hardness. The operation may therefore require to be undertaken outside normal working hours and at night. When the surfaces are at least 12h old any remaining loose or fine aggregate particles shall be washed off.

“Scabbling”, which refers to removal of all surface laitance plus roughening the concrete surface with (pneumatic) picks in order to expose the coarse aggregate in a uniform pattern, may be carried out on both horizontal and vertical surfaces. These areas should then be cleaned with a stiff brush under running water. The surfaces to be prepared in this manner shall be at least 12 hours old after mixing the concrete. At least 35% of the roughened surface area shall consist of exposed coarse aggregate. All surfaces prepared by “scabbling” shall be kept continuously wet until the next lift of fresh concrete is to be placed against them; the maximum time being 12 hours.

No fresh concrete shall be placed on the top surface of concrete which is laterally restrained (e.g. by formwork or by in-situ earth) while the bottom layer of concrete is between 3 hours and 12 hours old after mixing. No fresh concrete shall be placed on top of the concrete with an unrestrained lateral surface while the bottom layer of concrete is between 2 hours and 12 hours old after mixing.

The use of approved wet-to-dry epoxy resin concrete adhesive, strictly in accordance with the manufacturer’s instructions, will be permitted in the formation of concrete joints at surfaces where the concrete is older than 7 days.

The internal surface of joints in the reservoir floor and walls shall be sealed with a surface mounted “Hypalon” bandage system having an epoxy fixing system, all materials and procedures conforming to the “Sikadur-Combiflex” surface sealing system as produced by Sika (Pty) Ltd, or similar approved. The Contractor must ensure that where one Hypalon joint intersects another (at right angles or otherwise) that the two layers of intersecting hypalon are not epoxied to each other and thereby restrained from moving. ie. the Hypalon inside an intersecting joint must not be restrained by the epoxy adhesive and the full intended width should be free to move in the intended directions.

A 1mm thick Hypalon bandage is to be used on walls less than 6.5m and a 2mm thick bandage is to be used on walls greater than 6.5m.

The construction joints on the top (and sides where detailed on the drawings) of the reservoir roof slab are to be sealed with a 75mm wide self-adhesive aluminium foil strip (Bostik “Ditsit” or similar approved) which shall be installed in accordance with the manufacturer’s instructions. The “Ditsit” is to be taken over the edge of the roof slab and down the side of the wall for a distance of 500mm.

The construction joints on the soffit of reservoir roof slab are to be sealed with 2 coats of a 75mm wide application of SikaTop-Seal 107 (or similar approved) applied in accordance with the manufacturer’s recommendations. The soffit of the reservoir is to be ground down 1.5mm to 2.0mm with an angle grinder and then wire brushed and sprayed clean with water. The slurry is to be applied to a damp surface.

**PSG 5.5.7.5 Water Stops**

Add the following:

Water stops are to be placed in all wall and floor construction joints to the manufacturer's specification. The water stop in the floor joints will be "rearguard" type "Expandite Supercast Rearguard R" or similar approved and in the walls will be "dumbbell" type "Expandite Supercast Watafoil" or similar approved as specified on the drawings.

Water stops, where specified, shall be placed or kept in position as shown on the drawing. Care shall be taken during concreting to ensure that water stops are not displaced, bent over or punctured.

All water stops shall be manufactured from virgin polyvinyl chloride that complies with the following minimum performance requirements:

Tensile strength	12.2MPa	(min)
Elongation at break	250%	(min)
Water soluble content	0.15%	(max)
Softness (BS 2571)	38 to 50	

They shall be of the dumb-bell type and eyeleted or supplied with metal clips for the purpose of accurately fixing the waterstop between the reinforcement.

In each construction joint 150mm wide PVC water stops shall be placed as shown on the drawings.

All intersection points shall be factory made pieces.

All joints in straight lengths and between straight lengths and intersection places shall be hot welded in accordance with the manufacturer's instructions. Jointing other than by hot welding will not be permitted.

Water stops shall be carefully positioned and tied to the reinforcement to prevent displacement. Every precaution shall be taken to ensure maximum compaction around the water stop. The water stops shall then be returned to their horizontal positions ensuring that no voids are formed beneath them.

**PSG 5.5.8 Curing and Protection**

**Replace entire contents of G 5.5.8 (d) with the following and remove G5.5.8 (e)**

Freshly poured concrete surfaces not covered by shuttering shall be covered with an inner hessian membrane and an outer plastic membrane, free from rents and tears and lapping by not less than 150mm. The hessian and plastic membrane are to be firmly secured and kept flush to the concrete surface at all times.

The hessian membrane is to be kept continuously damp.

All curing activities shall be well managed and shall take place under the control of the quality control officer with all activities being logged against a quality control sheet in terms of the quality plan for the Contract

**Add the following:**

(f) retaining forms in place

(g) steam curing may be used on approval as specified by the Employer's Agent, provided that the rate of increase in temperature does not exceed more than 20°C per hour. Steam curing at higher than atmospheric pressure shall not be permitted if the concrete contains limestone aggregate. Humidity shall be kept between 90% and 100%.

(h) the use of curing compounds will not be permitted

(i) The use of alternative methods is subject to approval of the Employer's Agent.

**Delete the last two sentences of G 5.5.8 and replace with:**

Whatever method of curing is adopted, its application shall not cause permanent staining, contamination or marring of the surface of the concrete.

The minimum period of curing various types of cement shall be as follows:

1	2	3
Strength class of cement	Minimum curing period, d	
	Ambient temperature	
	15°C and higher	5°C and lower
42.5 R or higher	3	6
CEM I and CEM II A-S, D, P, Q, V, A, W, T, L, LL, M and blends of CEM I with 20% or less ground granulated blast-furnace slag or fly ash	7	14
CEM II B-S, P, Q, V, W, T, L, LL, M, CEM III, CEM IV, CEM V and blends of CEM I with more than 20% ground granulated blast-furnace slag or fly ash	10	20
NOTE When the ambient temperature is between 5°C and 15°C, the curing period shall be determined by interpolation between the given periods.		

During periods of extreme temperatures, these periods may be increased at the discretion of the Employer's Agent. The temperature of concrete shall be retained above 5°C for a period of 3 days after placement. Should the environment in which the concrete is placed be such that temperatures drop below 5°C in the concrete, then use shall be made of insulated formwork to retain the heat generated by cement hydration within the concrete.

Curing methods to be utilised for water retaining structures:

Concrete Element	Curing Method
Reservoir water tank floor slab	PSG 5.5.8, (d) *
Reservoir water tank walls	PSG 5.5.8. (f)*
Top surface reservoir roof slab	PSG 5.5.8 (d) *
Soffit of the reservoir roof slab	PSG 5.5.8 (f) *
Reservoir internal columns	PSG 5.5.8 (d)*or (i)

\* - As amended

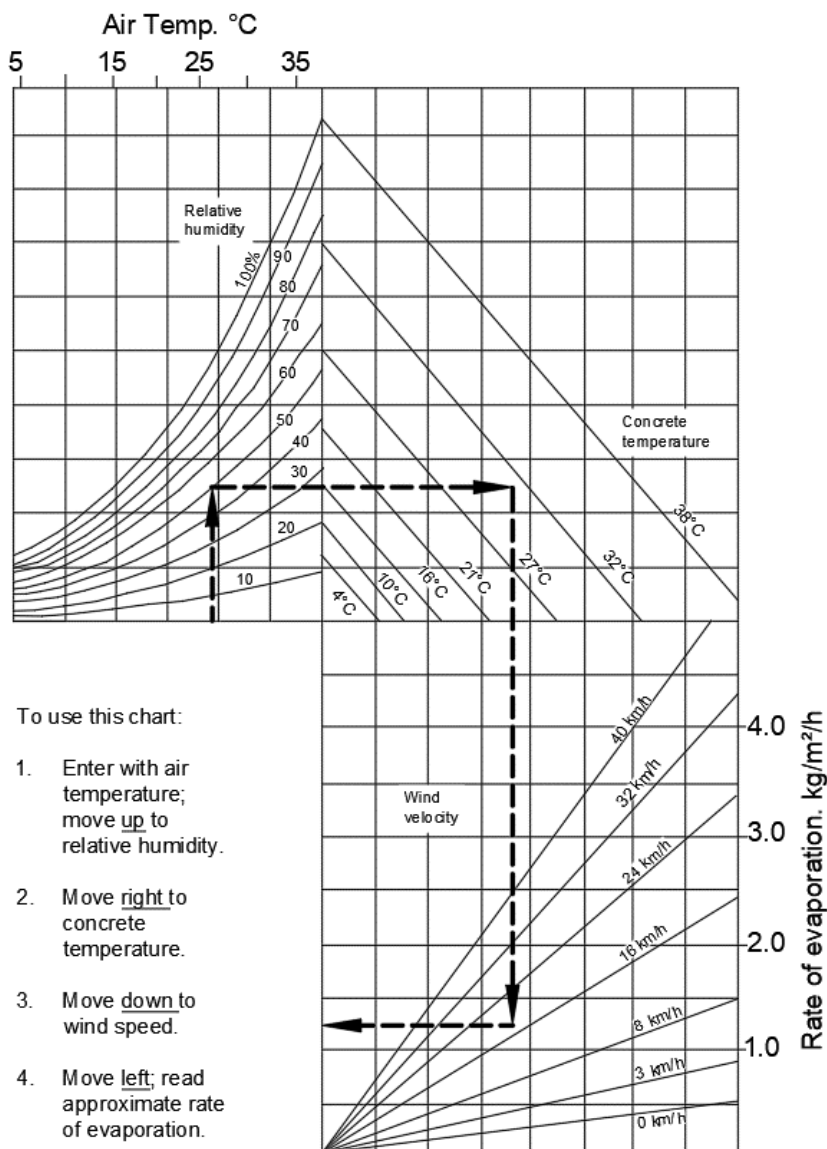
The rates for "Curing of Concrete" in the Schedule of Quantities will be paid to the Contractor on the successful outcome of the durability tests.

**PSG 5.5.9 Adverse Weather Conditions*****PSG 5.5.9.2 Delete Reference to 32° and Replace with 30°C.******PSG 5.5.9.4 Weather Station***

The Contractor is to provide equipment to monitor the wind speed, relative humidity, temperature and hence calculate evaporation rates at the site. The equipment must be able to record and store data for a minimum period of 60 days and have download capabilities. Data shall be downloaded by the Contractor and this data shall form part of the quality control data for the Contract.

The figure below taken from **ACI 305R-99, Hot Weather Concrete (2000)**, provides a graphical method for estimating the water loss due to evaporation in various weather conditions and shall be used by the Contractor to determine and monitor the evaporation

rate, particularly when planning for and during concrete placement. The windspeed, temperature and relative humidity shall be measured at least 2m above the evaporating surface.



If the rate of evaporation exceeds 0.5kg/m<sup>2</sup>/hour, the exposed concrete surfaces shall immediately be protected to prevent plastic cracking. It should be noted that plastic cracking may occur in cool weather with high wind velocities as well as in warmer weather conditions.

If in the opinion of the Employer's Agent, the weather conditions are too extreme and run the risk of adversely affecting the concrete, he may instruct the Contractor not to pour any more structural elements that day.

The Employer's Agent may call for protection against the wind to be provided, or the finished concrete to be covered with a plastic sheet or a fog spray to be utilised. Similarly, if it appears likely to rain, the Employer's Agent may instruct the Contractor not to pour any further concrete. An extension of time (without time related general costs) may be allowed at the Employer's Agent's discretion for delays incurred due to inclement weather. Any additional costs for these delays and/or protective measures are to be allowed for in the Contractors rates for concrete work. Curing of concrete for completed sections shall take place as detailed under the clause PSG 5.5.8.

**PSG 5.5.10 Concrete Surfaces*****PSG 5.5.10.2 Delete and replace with the following:***

Where a wood-floated or steel-floated or power-floated finish or a screed topping or granolithic finish is required in terms of the project specification, the concrete shall, unless otherwise stated in the project specification to a degree of accuracy II:

***PSG 5.5.10.4 Blowholes***

Add:

The Contractor shall make every effort to prevent blowholes from appearing on the off the form smooth finish. All noticeable defects shall be repaired to the Employer's Agent's satisfaction.

**PSG 5.5.12 Concrete in Wet Ground**

Delete the Sub-Clause and substitute:

Where concrete has to be laid in wet ground (e.g. River crossings) steps must be taken to lower the water level to at least 150mm below the bottom level of the concrete, and such level must be maintained for a period of at least two days after the concrete has been poured.

The cost of any necessary drains, sumps and pumping etc. necessary to achieve this shall be included in the tendered rates for the construction work and no separate payment shall be made for such dewatering throughout the construction period.

The Contractor shall be fully responsible for keeping the excavations free from water whilst the construction work is being carried out. The methods by which he proposes to achieve this shall be approved by the Employer's Agent before being implemented.

**PSG 5.5.13 Grouting**

Add to the Sub-Clause:

Grouting shall be done to the approval of the Employer's Agent using materials of suitable consistency as follows. Unless otherwise directed, the grouting admixture shall be added to 1 part cement and 2 parts concrete sand by volume, well mixed and with sufficient water added to obtain the required consistency. Where recesses to be filled are of appreciable dimensions, the Employer's Agent may direct the Contractor to replace a proportion of sand with fine stone to reduce shrinkage. The Employer's Agent may also require the Contractor to use non-shrink or other additives in grouting mixtures.

***PSG 5.5.13.1 Grouting of Pipes/Specials through Wall (New Sub-Clause)***

Add new Sub-Clause:

Where entry holes for pipes/specials have been provided in the walls, the Contractor shall be responsible for the grouting in of such pipes/specials regardless of whether or not these have been supplied by himself.

Before commencing the positioning in holes of any pipes/specials the Contractor shall:

Remove all shuttering and boxing remaining in the holes

Make any alterations required to the position and shape of the holes and reinforcing steel (lacing bars, etc) in the holes

Thoroughly clean and scabble the sides of the holes so as to obtain satisfactory bond surface for the new concrete

After accurately positioning the pipes/specials in the respective holes, the Contractor shall fix the pipes/specials in a suitable manner to prevent movement.

Immediately prior to grouting being carried out by the placing of mortar and concrete around the pipes, the surface of the existing concrete shall be saturated with water. All

surplus water shall be removed, and the surface covered with a layer, approximately 12mm thick, of mortar consisting of 3 parts concrete sand and 1 part cement.

The concrete ingredients shall be mixed and placed as dry as possible to obtain a dense, waterproof concrete. Where a watertight seal is required, the concrete shall be carefully worked around the puddle flange, if any, and the pipe barrel or body of the special and shall be vibrated in layers so as to obviate any falling away from pipe/special surfaces of the concrete already placed.

The hole shall when set, form a dense, homogeneous and waterproof mass.

A spare vibrator with an independent power source shall be kept as a standby measure to ensure continuity of placing in the event of the breakdown of the duty vibrator.

Smooth formwork that has been suitably strengthened for use with a vibrator shall be provided for facing the concrete around each pipe/special.

### ***PSG 5.5.13.2 Dry-Packed Grout (New Sub-Clause)***

Add new Sub-Clause:

When dry-packed grout is specified under baseplates etc., only sufficient water shall be added to make the mixture ball when squeezed in the hand. Before any grouting is done with dry caulking, the surfaces between which the caulking is to be placed shall first be thoroughly cleaned and flushed with water.

All surplus visible water shall be wiped or blown away and the dry caulking shall be forcefully rammed or hammered into place using suitable tools. Exposed surfaces shall be finished off neatly with a trowel and extensive exposed areas shall be covered with wet sacking and kept damp for at least 24 hours.

Where additives are required for grouting operations, these shall be brought on to site in the manufacturer's unopened containers and used strictly in accordance with the manufacturer's instructions. The Contractor shall undertake preliminary tests to check the behaviour of proprietary additives under the conditions pertaining to the site.

### ***PSG 5.5.13.3 Epoxy Grout (Epoxy mortar type only) (New Sub-Clause)***

Add new Sub-Clause:

The manufacturer's instructions shall be observed when an epoxy grout is used.

### ***PSG 5.5.14 Defects***

Replace the first line of G 5.5.14.1 with the following:

The concrete shall be homogeneous and free from honeycombing, interstices, planes of weakness and cracks.

Add the following to G 5.5.14.1:

The concrete for the water retaining structures (including the roof) shall be as dense as possible and no honeycombing permitted. If honeycombing is found to be a problem, the Contractor shall re-assess the concrete mix proportions and their concrete placing methods. No additional payment shall be made for adjustments to the concrete mix or placing methods.

Add the following to G 5.5.14.2

All authorized concrete repair work will be carried out as described below taking cognisance of the fact that repair mortars containing PVA Latexes shall not be used in any water retaining structures.

#### **1 Honeycombing:**

The area to receive patch material shall be primed with a bonding slurry (e.g. Sika MonoTop 610 or similar approved). The patch will then be built up while the slurry coat is still tacky by means of an approved cementitious polymer modified mortar (e.g. Sika MonoTop 615 HB Prostruct 528 or similar approved).

#### **2 Shrinkage cracks:**

A low viscosity solvent free structural epoxy resin is to be used to fill the cracks (e.g. Sikadur 52, ABE Epidermix 365/389 or similar approved).

### **PSG 5.5.14.3 Patching and Repair**

Where defects do not warrant the removal of defective concrete, one or more of the following procedures shall be required by the Employer's Agent:

- f) Where the structural strength might be affected and must be restored, repairs may be affected by the application of either pneumatically placed mortar or of a mortar made of silica sand and an approved epoxy formulation mixed and applied in accordance with the manufacturer's recommendations.

Where there are no fears as to structural strength, all defective material shall be chipped away until a dense uniform surface of concrete exposing solid coarse aggregate is obtained. Feathered edges shall be cut away to from surfaces perpendicular to the concrete face. Seized shutter bolts shall be cut back to at least 35mm into the concrete. All loose material shall be hosed away, and the surface of the cavity shall be saturated with water for at least 3 hours, after which a thin layer of neat cement mortar shall be applied to the surface. The cavity then shall be filled with stiff mortar mixed in the same proportions of cement to sand as that used in the original concrete. The mortar shall be thoroughly tamped into place in layers. The use of up to 30% white cement in place of the normal cement may be required to reduce the darker appearance of a patch. An interval of thirty minutes shall then elapse before a final surface tamping is given to the patch, after which the surface shall be treated to resemble the surrounding concrete as closely as possible. Board marks may be reproduced by striking a suitable piece of timber held against the plastic concrete. The patch shall be neat and workmanlike in appearance and after completion it shall be kept wet for a period of at least three days.

The cost of repairing any defective concrete shall be to the Contractors account.

The preparation, application and curing of the above repair materials shall all be in strict accordance with the Manufacturer's instructions.

Add the following Clause:

### **PSG 5.5.16 Manhole Covers and Frames (New Sub-Clause)**

Add new Sub-Clause:

Manhole frames are to be set into the concrete with the upper edge 10mm above the concrete level to prevent the entry of rainwater.

All areas of damaged galvanised surfaces are to be repaired using a cold galvanising system ('Zinga' or similar approved) as per manufacturer's instruction.

### **PSG 5.5.17 Rock Anchors and Threaded Anchor Bars**

Add the following Clause:

Where required, foundation dowels, pipe encasement dowels and anchor bars of specified material, diameter and length shall be installed at the positions and to the dimensions shown on the drawings or scheduled in the Bill of Quantities or as directed by the Employer's Agent. After exposing, cleaning and trimming the rock formation, holes with specified diameters and depths shall be drilled in the rock. After the holes have been cleared and prewetted, they shall be filled with 1-component, ready to mix, free flowing, low shrinkage expanding cementitious grout with a 7-day compressive strength of 80MPa.

A typical detail of the pipeline foundation dowels, reinforcement cage and concrete encasement is shown on the drawings.

All dowel bars shall be hot dipped galvanized to SANS 121 / ISO 1461.

All threaded anchor bars shall Grade 4.8 and hot dipped galvanized to SANS 121 / ISO 1461.

When the concrete is placed around the reinforcing steel, the reinforcing steel shall be clean, free from mud, oil, grease, paint, loose rust. Loose mill scale or any other substance which could have an adverse chemical effect on the steel or concrete, or which could reduce the bond.

## PSG 6 TOLERANCES

### PSG 6.2 PERMISSIBLE DEVIATIONS

#### *PSG 6.2.3(a) Replace with the Following:*

Description	Permissible Deviation in mm		
	Degree of accuracy		
	III	II	I
Spacing between two adjacent bars	± 25	± 20	± 15
Dimensional position of bar	± 20	± 10	± 10
Longitudinal location of bends and ends of bars	± 40	± 30	± 20
Cover to reinforcement	0 + 20	0 + 20	0 ± 20

## PSG 7 TESTS

### PSG 7.1 FACILITIES AND FREQUENCY OF SAMPLING

#### PSG 7.1.2 Frequency of Sampling

##### *PSG 7.1.2.2 Replace the Entire Contents of the Clause With:*

The Contractor shall provide the following number of sets of three standard metric 150mm metal cube moulds for the volume of concrete poured as per the table below:

**Table 4 - Frequency of compressive strength tests:**

Volume of pour (m <sup>3</sup> )	Number of sets
0 – 25	2
26 – 50	4
51 – 100	6
101 – 200	8
+ 201	10 (or as required by the Employer's Agent)

These sets of concrete cubes will be crushed when they are 7 and 28 days old.

Provide sufficient extra cube moulds for 3 days, 7 day, etc, crushing tests to be made as he so requires for their own purposes ie for shutter stripping, post-stressing cables.

Make and cure all cubes on site under the supervision of the Employer's Agent, in accordance with SANS Method 5863.

Be represented at the crushing test if he so wishes. Transport all cubes to the nominated laboratory between 7h30 and 11h00 on the last working day prior to the date of test. Only the results from this laboratory will be considered and will be the sole basis on which concrete is accepted or rejected.

#### PSG 7.1.2.4 Delete this sub-clause

### PSG 7.2 TESTING

#### *PSG 7.2.3 Laboratory Testing*

Add to the Sub-Clause:

All test cubes shall be made, cured and tested in accordance with the requirements of SANS Standard Method 5863 and 5864.

Test cubes shall be cured in an approved curing tank.

Delivery of cubes for testing shall take place not less than 24 hours in advance of the specified time for testing.

The Contractor shall keep accurate records of the exact position in the structure of the concrete batch represented by the cube test. All costs connected with sampling and testing of concrete, as described in this section of the project specification, shall be included in the relevant strength concrete rates.

### PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE

Delete the entire contents of G 7.3.1 and G 7.3.2 and replace with:

#### PSG 7.3.1

The Contractor is hereby advised that the only basis, on which concrete strength will be accepted or rejected, is on the 28-day cube strength obtained from cubes crushed at the nominated laboratory. Unless the conditions of sampling, cube manufacture, cube curing and record keeping are strictly adhered to, the test results will be meaningless. To this end it is emphasised that the Contractor must strictly comply with all the concrete test methods specified in SANS Method 861.

**Table 5 - Acceptance criteria for concrete strength**

Acceptance Category	Strength $C_s$ = Average minimum strength for 3 cubes at 28 days (MPa)
Characteristic strength for water retaining structures	35
Full acceptance	$C_s \geq 37$
Conditional acceptable	$33 \leq C_s < 37$
Rejection	$C_s < 33$

The descriptions given in the "Acceptance Categories" column above shall have the following meanings.

#### Full acceptance

Concrete shall be accepted unconditionally, subject to the concrete meeting the durability and cover criteria.

#### Conditional acceptance

Concrete shall be accepted with a warning that construction methods should be examined to improve the strength. A financial penalty of up to R75/m<sup>3</sup> will be applied on a pro rata sliding scale for all concrete poured where the average strength (for 3 cubes at 28 days) test results fall within the conditional acceptable range.

#### Rejection

At the discretion of the Employer's Agent, the concrete shall be removed and replaced at the expense of the Contractor.

#### Core holes

That test cores shall be drilled from the concrete and tested in accordance with the SANS Method 865 to determine the estimated actual strength and the estimated potential strength of the concrete.

If the results of the core tests show that the concrete meets the test requirements, the structure shall be accepted if the cores tests show that the concrete does not meet the strength requirements, an appropriate full-scale load test, as determined by the Employer's Agent, any be applied on the structure containing the defective concrete.

If load tests are, in the opinion of the Employer's Agent, impracticable, or where the portions of the structure subjected to such test fail to pass the test specified, he shall have the right to require strengthening or replacement of the portions of the structure concerned.

Upon removal of the core the hole is to be dampened and filled with a stiff mix of an expanding cementitious grout (Sika Grout G.P. or similar approved). Thereafter, an external slurry coat (0.25m x 0.25m) of a polymer modified cementitious coating (Sika Top-Seal 107 or similar approved) is to be applied over the exposed surface of the core hole.

### PSG 7.3.5. Replacement or Strengthening of Concrete

Delete after the words “the Contractor shall”, and insert

“Make adjustments in order to meet the specified requirements.”

Add:

### PSG 7.3.6. Table 6 - Acceptance Criteria for Concrete Cover

Acceptance Category	Concrete Cover (mm) (for specified cover of 50mm)
Full acceptance	$70 > C_d \geq 50$
Conditional acceptance	$45 \leq C_d < 50$
Acceptance with remedial measures	$40 \leq C_d < 45$
Rejection	$C_d < 40, C_d > 70$

The descriptions given in the “Acceptance Categories” column above shall have the following meanings.

#### Full acceptance

Concrete shall be accepted unconditionally, subject to the concrete meeting the strength and durability criteria.

#### Conditional acceptance

Concrete will be accepted with a warning that construction methods should be examined to improve the cover. A financial penalty of up to R15/m<sup>2</sup> will be applied on a pro rata sliding scale for each structural element where the average test results fall within the conditional acceptable range.

#### Acceptance with remedial

Concrete will be accepted if the Contractor measures undertakes remedial work at their expense, as approved by the Employer’s Agent, to improve the durability of the concrete to the criterion described as “full acceptance”,

#### Rejection

At the discretion of the Employer’s Agent, the concrete shall be removed and replaced at the expense of the Contractor.

Notwithstanding Clause 7.6.3 of the General Condition of Contract (Removal of improper work and materials) and Clause 7.7.1 of GCC (Contractor to search), the onus will be on the Contractor to prove to the Employer’s Agent the extent of the concrete for which the durability and cover values fall below the Specified Values (in the above tables), and the cost of this searching is to be included in the Contractor’s rates for concrete.

An item has been included in the Schedule of Quantities for the making good of core holes as directed by the Employer’s Agent.

Where the Employer’s Agent or their representative has reason to doubt whether the concrete cover over the reinforcement is not in accordance with the requirements of clause PSG 5.1.3, the cover shall be tested with a cover meter. If necessary, the Employer’s Agent or their representative shall then indicate to the contractor where he must expose the reinforcement to prove the depth of cover.

Add:

**PSG 7.3.7 Costs of Tests**

The costs of all tests required by the Employer's Agent or their representative shall be borne by the Employer except that costs of tests as set out hereunder shall be borne by the contractor –

- (a) preliminary tests on materials and of mix proportions;
- (b) all tests as may be made necessary by reason of the provisions of clause SABS 1200 G 7.3.5;
- (c) such tests, including concrete coring and load tests, as may in the opinion of the Employer's Agent be made necessary by failure on the part of the contractor to meet the requirements of this specification.

Add:

**PSG 7.3.8 Durability Index Tests**

To ensure that the concrete has been placed, compacted and cured correctly, a number of tests will be carried out by a nominated laboratory on the concrete after curing has been completed ie 26 to 30 days after placing of the concrete.

- 1) A set of four 68mm diameter cores, 75mm in length will be drilled at each test location through the covercrete (being the concrete layer between the outermost layer of steel reinforcement and the exposed outer surface of the concrete element) from the constructed concrete element when the concrete has reached 28 days of age. A slice (30mm thick) will then be cut from the outer surface of this core such that the slice is representative of the middle layer of the covercrete (ie the middle layer being a 30mm thick slice of concrete, 15mm from the exposed outer surface extending in towards the reinforcement) and tested for:

- 1.1) water sorptivity,
- 1.2) oxygen permeability, and
- 1.3) chloride conductivity

The positions at which the cores will be extracted will be indicated by the Employer's Agent.

The oxygen permeability and chloride conductivity test procedures shall be carried out in accordance with SANS 3001-C03 – 2-2015 and SANS 3001-C03-4-2015 respectively.

The water sorptivity test procedure shall be carried out in accordance with the *Durability Index Testing Procedure Manual V4.2 (UCT) (2017)*, which can be obtained from the University of Cape Town's website at:

[http://www.uct.ac.za/sites/default/files/image\\_tool/images/333/Downloads/UCT-WITS DI Manual\\_2017 Ver 4.2 2017-07-14.pdf](http://www.uct.ac.za/sites/default/files/image_tool/images/333/Downloads/UCT-WITS_DI_Manual_2017_Ver_4.2_2017-07-14.pdf).

- 2) The depth of concrete cover achieved will be measured to ensure that the specified values have been achieved.

The cost of these tests will be borne by the Employer if the results are equal to or exceed the specified value. The Contractor will pay for the tests if the results fall below the conditional acceptance range.

**Table 7 - Acceptance criteria for durability testing structural element**

Acceptance Category	Oxygen permeability index (log scale)	Water sorptivity (mm h)	Chloride Conductivity
Full acceptance	$O_p \geq 9.15$	$W_s \leq 8$	$C_c \leq 0.75$
Conditional acceptance	$9.15 \geq O_p > 9.0$	$8 < W_s \leq 12$	$0.75 < C_c \leq 1.50$
Acceptance with remedial measures	$9.0 \geq O_p > 8.75$	$12 < W_s \leq 15$	$1.50 < C_c \leq 2.50$
Rejection	$O_p < 8.75$	$W_s > 15$	$C_c > 2.50$

The descriptions given in the "Acceptance Categories" column above shall have the following meanings.

#### **Full acceptance**

Concrete shall be accepted unconditionally, subject to the concrete meeting the strength and cover criteria.

#### **Conditional acceptance**

Concrete will be accepted with a warning that construction methods should be examined to improve the durability. A financial penalty of up to R75/m<sup>3</sup> will be applied on a pro rata sliding scale for each structural element where the average test results fall within the conditional acceptable range.

#### **Acceptance with remedial**

Concrete will be accepted if the Contractor measures undertakes remedial work at their expense, as approved by the Employer's Agent to improve the durability of the concrete to the criterion described as "full acceptance",

#### **Rejection**

At the discretion of the Employer's Agent, the concrete shall be removed and replaced at the expense of the Contractor.

Add:

### **PSG 7.3.9 Water Tightness Testing**

#### ***PSG 7.3.9.1 Water Tightness Testing and Disinfection for Reservoir***

Disinfection shall be carried out under the supervision of the Employer's Agent and the Employer and shall comply with Code of Practice for Disinfection of Potable Water Facilities. The Contractor shall keep the pipeline clean throughout the Contract by making use of end caps or other approved methods.

A hydraulic test shall be undertaken on the reservoir structure before backfilling and no backfilling will be permitted before this test and the acceptance of the structure for water tightness.

All interior surfaces of the reservoir shall be broomed, cleaned and hosed down and the cleaning water run to waste.

The reservoir shall then be filled slowly at a rate not exceeding 2m in 24 hours and allowed to stand for 7 days to allow absorption to take place. The Contractor shall allow for adding chemicals to sterilize the reservoir.

The water level will be taken thereafter every 24 hours for 7 days. A maximum drop in surface level of 10mm will be permitted over the full period of 7 days. Should the structure not stand this test the Employer's Agent may order a second test, and should this fail, the Contractor shall be responsible for finding the leaks and taking such measures as necessary and approved by the Employer's Agent to produce a satisfactory test.

**Water for testing and disinfection shall be metered.**

Water for the second and subsequent tests will be charged to the Contractor at current tariff rates.

The lump sum price for the hydraulic testing of the reservoir shall for cleaning all internal surfaces, adding chemicals and testing.

### **PSG 7.3.9.2 Water Tightness Testing for Roof Slab**

Water tightness testing of the concrete roof / reservoir roof shall be undertaken upon completion, before filling of the reservoir, by flooding the roof and maintaining a minimum depth of 100mm for 72 hours.

If at any time during the water tightness test the roof shows any sign of water leakage or visible dampness on the soffit or perimeter walls it shall be deemed defective. Defective works shall be dealt with in accordance with the requirements of G 5.5.14, as amended.

### ***PSG 7.3.9.3 Water Tightness Test for Chambers and Buildings***

Add new Sub-clause:

All reinforced concrete chambers and buildings shall be constructed watertight with bituminous sealing 1-part polyurethane hydrophilic sealant which swells when in contact with water to seal all types of construction joints and penetrations in concrete and 150mm wide self-adhesive bituminous tape suitable for buried conditions on external face of construction joints.

On completion of each concrete valve chamber, and prior to completion of the backfilling around the chamber, a water tightness test shall be undertaken by the Contractor. This shall be carried out for 24 hours with continuously maintaining the chamber excavation working space periphery to ground level full of water for at least 4 hours. Should there be any noticeable leaks into the chamber, the Contractor shall carry out at their own expense whatever measures are necessary to waterproof the chamber to the Employer's Agent's satisfaction. On completion of successful water tightness test for the chamber, the Contractor shall dewater the excavation before backfilling around the chamber.

## **PSG 8 MEASUREMENT AND PAYMENT**

### **PSG 8.1 MEASUREMENT AND RATES**

#### **PSG 8.1.2 Reinforcement**

Add the following to Sub-Clause:

In addition to the requirements of SANS 1200G the Contractor shall allow in their rates for curving bars to required radius, where required.

#### ***PSG 8.1.2.2(a) Reinforcement***

Delete the second paragraph and substitute with:

The quantities (or percentages) of all other sizes of steel bars that are scheduled may be subject to variations and the contract prices for these will be fixed regardless of the magnitude of such variations (if any).

#### ***PSG 8.1.3.1(b) Overbreak***

Delete the Sub-Clause and substitute with:

The scheduled rate for overbreak in rock excavation to structures shall include, inter alia, for the excavation of material, cleaning, washing and brushing with grout and for refilling with Grade 20/19 concrete together with all necessary shuttering and including the additional thickness of 50mm to the concrete in lieu of blinding on horizontal floors.

The Contractor is to make their own estimate of the extent of overbreak where no overbreak allowance has been allowed for. The Contractor will not be paid for overbreak in intermediate or soft material.

**PSG 8.2 SCHEDULED FORMWORK ITEMS****PSG 8.2.2 Smooth**

Add to Sub Clause:

The unit of measurement shall be square metre (m<sup>2</sup>) or number off (No.)

**PSG 8.2.6 Box Out Holes/Form Voids**

Add to Sub-Clause:

e) Large, circular, of diameter greater than 0.7m up to 1.0m Unit: No.

Depths as in (a) above.

**PSG 8.4 SCHEDULED CONCRETE ITEMS****PSG 8.4.7 Curing and Protection**

Add new Sub Clause:

The unit of measurement shall be as follows:

g) Reservoir Floor Slab	Unit: m <sup>2</sup>
Reservoir Walls	Unit: m <sup>2</sup>
Top surface of the reservoir roof slab	Unit: m <sup>2</sup>
Soffit of the reservoir roof slab	Unit: m <sup>2</sup>
Reservoir Columns	Unit: No.

The tendered rates shall include full compensation for the supply of all labour, plant and materials to ensure that all concrete shall be protected from contamination and loss of moisture by one or more of the curing and protection methods set out in Clause 5.5.8.

**PSG 8.4.8 Concrete Complete with Formwork – Access Driveways, Precast Slabs and Other Minor Concrete Slabs**

Add new Sub-Clause:

Separate items, where so required, have been included in the Bill of Quantities for concrete complete with formwork for each particular grade of concrete or for structural units of similar size and shape, or for both.

The unit rates shall cover the cost of fixing the steel, the provision of concrete, mixing, testing, placing, compacting, the forming of stop-ends and unforeseen construction joints, forming of holes where required, encasements for ventilation pipes, striking off or 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, the provision of the required surface finish plus the layout and plant necessary to erect and strike such formwork.

The rate shall include for the casting into the concrete, of pipe work for breather pipes, security manhole covers or whatever is required in terms of the drawings for same. The rate shall include for the placing onto position of precast slabs where applicable.

Unit: m<sup>3</sup>

**PSG 8.9 GROUTING OF PIPES/SPECIALS THROUGH WALLS OR SLABS**

Add new Sub-Clause:

Items, where so required, have been included in the Bill of Quantities for the grouting of pipes and specials through box-outs or broken out openings in walls or slabs. The rates shall include for all necessary labour, plant and materials required to carry out the work

described in PSG 5.5.13 and for finishing to the required quality. Quantities specified by size of pipe.

Unit: No.

## **PSG 8.10 CASTING OF PIPES/SPECIALS THROUGH WALLS OR SLABS**

Add new Sub-Clause:

Items, where so required, have been included in the Bill of Quantities for the casting of pipes or specials through walls or slabs. The rates shall include for all labour, plant and materials to make the necessary modifications to formwork to allow the pipe or special to be cast in, the positioning of the pipe or special and for finishing the concrete surface to the required quality around the pipe or special at the end of the concreting operation.

Unit: No.

## **PSG 8.11 GROUTING STEEL PIPE INSIDE CONCRETE JACKED SLEEVE**

Add new Sub-Clause:

The rate shall include for the supply, mixing and application of the grout as per the relevant drawings, prevention of the steel pipe from floating and the curing of the grout, inclusive of the sealing off of the voids to be grouted.

Unit: m<sup>3</sup>

## **PSG 8.12 MISCELLANEOUS WORK OTHER THAN METAL WORK**

Separate items will be scheduled for each type of miscellaneous work.

The tendered rates shall include full compensation for providing all labour, materials and equipment required to carry out the work, for all preparatory work, for constructing the work scheduled in a workmanlike manner and for finishing-off and cleaning up when the work has been completed.

Unit: as scheduled

## **PSG 8.13 CONCRETE RETAINING BLOCK WALLING**

Add new Sub-Clause:

The unit of measure shall be the square metre of walling measured vertically from the top of the foundation to the top of the wall.

The rate is to include for the supply and placing of the specified block type and size including the construction of the concrete base, compaction of the fill placed in and 300mm behind the blocks. The rate to include for all plant, labour, materials and incidentals necessary to carry out the work.

The tendered rates shall include for the engineering design by the supplier as well as the issuing of an engineering certificate of approval by the Contractor, to the Employer's Agent.

Unit: m<sup>2</sup>

## **PSG 8.14 ROCK ANCHORS**

### **PSG 8.14.1 Drilling of Dowel Bars (Foundation and Pipe Encasement) and Threaded Anchor Bar Holes**

Add new Sub-Clause:

The unit of measurement shall be number (No.) of per depth per foundation dowel/ anchor diameter size as stipulated in the Bill of Quantities and/ or shown on the drawings.

The tendered rates shall include for full compensation for drilling, clearing and cleaning the holes as specified.

**PSG 8.14.2 Dowel Bars (Foundation and Pipe Encasement)**

Add new Sub-Clause:

The unit of measurement for the dowel bars shall be the tonnes (t) of bars provided and secured in position.

The dowel bars type shall be hot dipped galvanized with diameter, length and type of grout shall be shown on drawings or stipulated in the Bill of Quantities

The tendered rates shall include for full compensation for supplying all material, bending to the required shape codes, cutting and bending on site to suit site conditions and cover requirements, positioning and grouting the dowel bars as specified in the Bill of Quantities and/or drawings.

**PSG 8.14.3 Threaded Anchor Bars**

Add new Sub-Clause:

The unit of measurement for the threaded anchor bars shall be the number (No.) of bars provided and secured in position.

The threaded anchor bars type shall be hot dipped galvanized with diameter, length and type of grout shall be shown on drawings or stipulated in the Bill of Quantities.

The tendered rates shall include for full compensation for supplying all material, cutting and position and grouting the dowel bars as specified in the Bill of Quantities and/or drawings.

Unit: No.

**PSG 8.15 PRESSURE GROUTING**

Add new Sub-Clause:

The unit of measurement for grouting shall be the kilogram of cement or propriety make of grout as may be applicable used in the grouting operation.

The grout type and for which purpose it is required is shown on drawings and/or stipulated in the Bill of Quantities.

The tendered rates shall include for full compensation for providing the equipment and all material, mixing and pumping the grout into the prepared holes in accordance with the instructions of the Employer's Agent and for the water pressure tests.

Unit: kg

**PSHA STRUCTURAL STEELWORK – SUNDRY ITEMS (SABS 1200 HA – 1990)**

**PSHA 3 MATERIALS**

**PSHA 3.1 STRUCTURAL STEEL**

The steel shall be Grade 300W for hot rolled steel sections (I, H, C, L). All members shall carry the Grade 300W steel symbol to identify steel grade prior to manufacturing.

All other structural elements, tubular profiles, flat bars, squares, rounds, checker (“vastrap”) floor plate shall be Grade 43 or as specified on the drawings. The thickness of a checker (“vastrap”) floor plate, is the under-pattern thickness.

**PSHA 5 CONSTRUCTION**

**PSHA 5.1 DRAWINGS AND SHOP DETAILS**

**PSHA 5.1.2 Contractor to Provide Shop Details**

Add to the Sub-Clause:

The Contractor shall prepare their own shop details based on the dimensions and details given on the drawings and will be required to submit their shop details to the Employer’s Agent at least 3 weeks prior to fabrication. Written consent must be obtained from the Employer’s Agent, prior to commencing fabrication. The Contractor is still responsible for ensuring that the shop details are dimensionally correct.

**PSHA 5.2.10 Protective Treatment**

Add to the Sub-Clause:

All mild steel shall be heavy duty hot dip galvanised except where shown to the contrary on the drawings or in the schedule of quantities. Hot-dip galvanising shall conform to SANS 121 / ISO 1461 for heavy duty coatings or equivalent.

Screwed and socketed tubing shall be galvanised in compliance with BS 1387. Galvanised, malleable cast iron fittings shall comply with SANS 14.

All paint shall be delivered at the workshop as well as on the site in the original containers that display the manufacturer’s name and trademark as well as the SABS mark. The Employer’s Agent may, at their discretion, prescribe the manufacturer and the type of paint.

The coating system shall be from one manufacturer only. The paint manufacturer’s instructions shall be strictly adhered to.

Surfaces in contact with each other after assembly or erection shall receive the primer beforehand, except for faying surfaces for friction-grip fasteners.

The application of the final coats of paint before erection will be permitted by the Employer’s Agent only in special circumstances or where specified elsewhere.

After erection of the steelwork, the specified paint system shall be reinstated in all areas where it has been damaged. All fasteners shall also be treated in accordance with the specified paint system.

No painting on the site shall be done in inclement weather or when humidity or frost is liable to cause wet or damp conditions on the surface to be painted.

No painting shall be done if the temperature falls below 7°C.

Welded seams shall be thoroughly steel brushed before painting. Permission shall be obtained from the Employer’s Agent before slag residue may be neutralized with acids or alkalis.

**Surface preparation in the workshop**

SIS 05 59 00 or ISO 8501 shall apply and shall be referred to in respect of this clause.

### Manual scraping and wire brushing

This treatment shall normally be applied in all circumstances except if and where blast cleaning is specified.

Prior to treatment, the steel surface shall be cleaned of dirt and grease.

Heavier layers of rust shall be removed by chipping.

All loose mill scale, rust and foreign matter shall be removed by very thorough scraping, wire-brushing, machine-brushing, grinding, etc.

Finally, the surface shall be cleaned by vacuum cleaner, with clean dry compressed air, or with a clean brush.

The surface shall have a pronounced metallic sheen with an appearance equal to or better than that shown on the prints designated ST 3 in SIS 05 59 00 or ISO 8501.

### Blast-cleaning

This treatment may be used but is not obligatory unless so specified hereinafter. If blast cleaning is preferred to normal scraping and wire brushing, the final surface shall be equal to or better than that specified in sub sub-clause 3.1.2.1.

### Paint system

The paint system shall be applied in accordance with the specifications given in table 3.1 below. Application may be by brush, roller or sprayed. Red lead may not be used.

All structural steel which is not visible, e.g. purlins, rafters and trusses, shall receive only the primer coat. All visible steel shall receive the full appropriate paint system treatment.

In all cases the manufacturer's specification for any paint product must be followed.

Paint system for new steel surfaces for unpolluted inland environments (not suitable for temperatures above 90 °C):

Coat No	Place of application	Time of application	Min thickness in µm	Types	SABS-Specification
1. Primer	Workshop	Within 4 hours of surface treatment	50	Zinc phosphate Plascopeprime 182 QD (Plascon) or D193-1029 (Dulux)	(None)
2. Two final coats; colour as specified elsewhere	Site	After erection. 2nd coat within 48 hours of 1st	Each coat 25 to 40	High-gloss enamel or structural steel paint	630 Type I 684 Type A

### Paint system for newly galvanized surfaces:

#### Recommended surface preparation:

Degrease with Plascon Aquasole Degreaser GR 1 or similar approved. Any cement or foreign material must also be removed from the metal surface.

Rinse with clean running water while protecting the floors and walls.

Wash with Galvanised Iron Cleaner GIC 1 by Plascon, or similar approved.

Rinse with clean running water and allow to dry. Protect the floors and walls.

Apply one coat of Plascon Aquafast Etch Primer no EMS 18 or similar approved to a total dry thickness of 35 microns. Must be overcoated within 72 hours to avoid excessive hardening.

Two final coats as specified in table 3.1

**HOT DIPPED GALVANIZING (See also subclause 5.9 in SABS 1200H)**

Steelwork described as “hot dipped galvanised” shall be galvanised after manufacturing and before delivering to site by means of the hot dipped process complying with the minimum requirements of SANS 121 / ISO 1461 (latest amendment). Structural steel members shall be given an 85-micron thick galvanised coating, or such other thickness as may be specified in accordance with SANS 121 / ISO 1461. (Table 1)

Damaged surfaces must be thoroughly cleaned and if welding has been carried out all slag must be removed preferably by the use of a chisel hammer.

Before galvanising all surfaces of the metalwork shall be thoroughly cleaned of all scale and rust by shot blasting in accordance with SANS 064 or by pickling and then fluxed ready for galvanising.

The zinc coating shall be even and continuous over all surfaces, free of bare spots, dull or rough patches, blisters or other imperfections. The zinc coating shall show no signs of peeling and shall be uniform in thickness.

All M8 and greater bolts, nuts, screws and other threaded components, shall be hot dip galvanised to SANS 121 / ISO 1461 (previously articles type C).

**Repairing of damaged coatings****Plant repairs**

Should any black spots or uncoated areas greater than 5mm<sup>2</sup> (individual) or 25mm<sup>2</sup> (collective) per m<sup>2</sup> or per m run be present after galvanizing, the coating shall be repaired. This is to be carried out using abrasive blasting following by zinc metal spray. The zinc metal spray shall be applied at least 25% thicker than that specified and shall overlap the damaged area by 20mm to 25mm. The finished coating shall be wire brushed to remove any excess metal spray.

Hot patch soldering is an alternative at the plant but is seldomly used, as the method needs to be conducted while the product is still hot before quenching.

**Site Repairs**

Zinc metal spray as set out above.

The recommended alternative is to use a zinc rich paint provided it has at least 90% zinc in the dry film, by mass. The paint should be a zinc rich epoxy in conformance with SABS 926. A single pack zinc rich paint such as Plascon's “Plascozinc Polygalv Primer” or equal can be applied.

**PSHA 5.2.11 Pipe Clamps and Brackets (New Sub-Clause)**

Add new Sub-Clause:

Clamps and brackets around pipes are to be constructed to the details shown on the drawings and are to be provided with all necessary bolts for fixing to concrete.

**PSHA 5.3.6 Grouting**

Add to the Sub-Clause:

The Contractor will be fully responsible for all grouting work under this Contract.

**PSHA 6 TOLERANCES****PSHA 6.2 TOLERANCES ON DIMENSIONS, ACCURACY OF ERECTION, ETC****PSHA 6.2.2 Other Tolerances**

Add to the Sub-Clause:

The accuracy of erection shall be the degree of accuracy II as tabulated but amended as follows:

In items d(1) and d(2) of the table the Degree of Accuracy given as " $\pm 5$ " shall be read as " $\pm 3$ ".

## **PSHA 7 TESTING**

### **PSHA 7.1 TEST CERTIFICATES**

Delete the part sentence "in terms of the project specification" from the wording of the Sub-Clause and add the words "when so requested by the former" at the end of the sentence. The Employer's Agent shall be afforded the opportunity to inspect shop manufactured steel works at the factory.

## **PSHA 8 MEASUREMENT AND PAYMENT**

### **PSHA 8.3 SCHEDULED ITEMS**

Add the following introduction to the subsequent Sub-Clauses:

The tendered rates shall cover the cost of preparing shop details (where applicable), the supply of all materials, fabrication, process control, loading, transporting to Site, off-loading, erection (unless separately included), setting into concrete or brickwork and grouting in. They shall also include for the supply of all nuts, bolts, holding down bolts, washers, rivets, cutting to waste, all temporary bracing, templates and shuttering necessary for installing, transporting and erecting.

Where the scheduled items for steelwork include corrosion protection, then the price stated shall also include for such protection as specified in SABS 1200HC. Similarly, the materials and corrosion protection for nuts, bolts, washers etc. shall match the steelwork ordered.

Where the requirements of the above introduction conflict with the requirements of Sub-Clauses 8.3.1 to 8.3.6 inclusive the requirements of the introduction shall take precedence.

#### **PSHA 8.3.3 Ladders, Complete and Installed**

Add to Sub Clause:

The rate shall cover the cost of supplying all materials as scheduled in the bill of quantities for each ladder, safety cage including stringers, rungs, lugs or other means of chemical fixing to walls with stainless steel anchors, floors, etc., as shown on the drawings, and fabricating, installing and grouting in.

The rate shall cover the cost of supplying ladders and safety cages to required lengths.

Unit: m or No.

#### **PSHA 8.3.4 Flooring, Complete and Installed with Frames**

Add to Sub Clause:

The unit of measurement shall be Sum or m<sup>2</sup> or No. or m.

## **PSL MEDIUM PRESSURE PIPELINES (SABS 1200 L – 1983)**

(Applicable to SABS 1200 L – 1983)

NOTE: Any specification under these amended specifications which are in conflict with the eThekweni Water and Sanitation Standard particular specification, shall see the amended specification taking preference.

### **PSL 3 MATERIALS**

#### **PSL 3.1.1 Materials Control (New Sub-Clause)**

Add new Sub-Clause:

##### **PSL 3.1.1.1 Checking material lists and drawings (New sub-clause)**

Add new Sub-Clause:

Not more than 4 weeks after the contract has been awarded, the Contractor shall check the Materials Lists against the drawings and advise the Engineer in writing of any shortages or omitted items. This applies to free issue items, if issued.

If any variations in the contract is authorized, the Contractor shall ensure that any additional items to be supplied by the Employer and the Contractor, are ordered in good time so as not to cause delay to the works.

The Contractor shall check the delivery timing of all pipe and fittings and ensure that it is in line with the Contract programme. Any critical items that could be delivered late are to be brought to the attention of the Engineer.

The delivery status of materials is to be checked and followed up upon by the Contractor throughout the contract.

##### **PSL 3.1.1.2 Materials control – general (New sub-clause)**

Add new Sub-Clause:

The Contractor is held responsible for the inspection and control on site of all the pipe supplied as free issue materials for the duration of the contract. Once pipe material and equipment has been accepted, any subsequent damage shall be made good to the satisfaction of the Engineer at the expense of the Contractor. Damage to internal linings and external coatings that are necessary and incidental to good welding practices and the manufacturing of pipe specials are excluded.

Any item damaged beyond repair shall, at the discretion of the Engineer, either be replaced at the Contractors expense or the value of the asset reimbursed in full to the Employer.

##### **PSL 3.1.1.3 Material storage (New sub-clause)**

Add new Sub-Clause:

The Contractor shall store all items to be incorporated into the Works so that no damage occurs whilst awaiting installation. Where practical, items are to be stored in containers for protection from the weather and pilferage.

All piping, pipe fittings, and equipment stored outside or awaiting installation are to be protected from the weather and storm water and soil wash, using plastic sheeting that is highly UV resistant and storing same on pre prepared concrete surfaces. Pipes taken over

from the Employer shall receive the required attention in order to ensure safe storage in yards, protected from fires, vandalism and incidental damage that can reasonably be prevented.

#### **PSL 3.1.1.4 Handling pipe, fittings and equipment (New sub-clause)**

Add new Sub-Clause:

Strict supervision shall be maintained by the Contractor at all times when handling pipes and equipment. Pipe is to be lifted with a lifting beam and slings which shall be fitted at quarter points around the pipe. Due care shall be taken when fitting and placing slings to ensure that ancillary items do not get crushed during lifting. Pipe coating is to be protected by padding or otherwise from scuffing damage during lifting.

The equipment utilized for lifting pipes, must be approved by the Engineer for the purpose of ensuring that the lifting equipment is appropriate and will not damage the pipe coating. It is not allowed to handle pipes with chains or any other device involving metal contact with the pipe coating.

The Contractor shall ensure that all lifting equipment complies with the relevant safety regulations.

#### **PSL 3.1.1.5 Stacking of pipes and pipe spools (New sub-clause)**

Add new Sub-Clause:

The Contractor shall take due care when stacking pipe or pipe spools at the workplace. Pipes must never be placed directly on the ground but shall be stacked on dunnage according to approved methods and shall be separated from one another with the use of applicable methods approved by the Engineer.

Should the Contractor wish to use tyres as dunnage, all tyres shall be removed from site upon completion of the Works or upon completion of work at a specific location where tyres were utilized.

#### **PSL 3.1.1.6 Segregation of special items (New sub-clause)**

Add new Sub-Clause:

All items/equipment which are to be used as paired items shall be marked as "special items" by the Contractor. Examples of this are valve mating flanges, flat faced flanges, etc. The Contractor shall take special care when storing items that are marked, "special items", in order to ensure that they are not utilized by mistake as bulk items.

#### **PSL 3.1.1.7 Controlled issue of lined pipe (New sub-clause)**

Add new Sub-Clause:

The Contractor shall establish a data base of free issue and or procured pipe material which will reflect each and every pipe number of pipe lengths under his control, together with the pipe data of each of the pipes, next to the pipe number. The pipe data will clearly indicate the grade of steel and the wall thickness for each pipe number. Any lengths of pipe or piece of pipe cut from a full length, shall be able to be traced to original manufacturing data, at all times.

The Contractor shall control the issue of lined pipe using cutting lists, in order to minimize scrap metal and avoid unnecessary field butts. The Contractor shall ensure that pipe identification marks are transferred in a controlled manner onto cut sections of pipe to ensure 100% future traceability. The cutting of pipes and the transferring of identification marks shall be carried out under the close supervision of the Contractor's Quality Control

Officer. The Contractor shall, at any stage as required by the Engineer, produce the pipe data base on site in order for the Engineer to verify the origin of section of pipe built into pipe specials.

The Contractor's rates for compliance with his obligations in terms of quality control shall be deemed to include for the establishment of the required data base and the control of pipe material on site.

The Contractor shall take note that any cutting of standard length of pipe, for the purpose of making the pipe more manageable in restricted areas, will not be compensated for by payment for additional field joints.

Free issue pipe, if any, shall be utilized optimally to reduce waste. Any pipe damage, to a point that the pipe length requires rejection for use, as a result of the Contractor manhandling pipe inappropriately, shall be noted and the Employer shall require financial compensation to the equivalent value of the asset value. The resultant scrapped pipe shall be removed from site at the Contractor's cost.

#### **PSL 3.1.1.8 Scrap material (New sub-clause)**

Add new Sub-Clause:

Scrap metal from free issue pipe where applicable, shall be sold to scrap dealers at the best rate obtainable and the income generated from these sales shall be refunded to the Employer where such refund shall be consolidated in the following payment certificate, shown as a deduction. A consolidated summary sheet shall be added to the payment certificate for this purpose.

#### **PSL 3.1.1.9 Employer supplied and contractor supplied material control (New sub-clause)**

Add new Sub-Clause:

All materials must be checked and listed against their respective material and test certificates, to ensure that such materials can be readily identified and traced to its material certificates and listings.

#### **PSL 3.1.1.10 Cleaning of inside of pipe supplied by the Employer (New sub-clause)**

Add new Sub Clause:

The Contractor shall, upon instruction of the Engineer, clean the internal surface of pipe before incorporation of the Works. This might be required as a result of the duration of the pipe laid in the pipe yard before use.

#### **PSL 3.1.1.11 Acceptance of pipes, fittings and materials – free issue materials (if applicable) (New sub-clause)**

Add new Sub-Clause:

Before acceptance of any pipes, fittings or other items of equipment issued as free issue materials ( where applicable), the Contractor is to carry out a thorough inspection to ensure that the materials have been delivered undamaged and are as ordered.

Pipes shall be checked for:

Identification

Certification

Soundness of internal lining  
 Ends beveled correctly  
 Circumference according to specification and within tolerance  
 Quantity agrees with advice note

Inspection of pipe fittings, valves and other equipment shall include but is not limited to:

Identification  
 Certification  
 Material, schedule and rating  
 Lining where specified  
 Coating where specified  
 Circumference according to specification and tolerance  
 Damage to items - example flange faces

Defective items shall not be accepted, but marked, quarantined and immediately reported to the Engineer.

If accepted, the Contractor shall take the required steps to ensure that all delivery documentation together with signed acceptance notes is filed in the construction dossier

## **PSL 3.4 STEEL PIPES, FITTINGS AND SPECIALS**

### **PSL 3.4.1 General**

Add the following to L 3.4.1:

Steel pipes, fittings, flanges and specials shall be coated and lined in accordance the lining or coating systems approved by eThekweni Water and Sanitation as detailed in the Linings and Coatings Particular Specification.

Steel pipes less than DN600 to be supplied by the Contractor shall be:

Grade X42, 4.5mm thick spigot and socket pipe plain ended on the non bell side for fillet welding at the bell when jointing

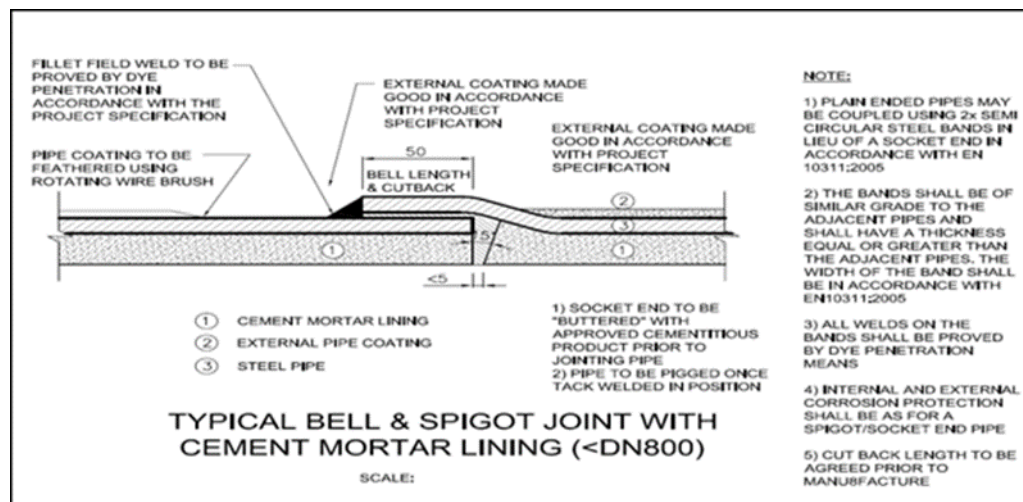
Three-Layer Polyethylene (3LPE) coated on the outside, pipe coating system 4 (PCS 4) as per eThekweni Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13

Cement mortar lined internally, pipe lining system 2 (PCS 2) as per eThekweni Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13

All steel pipe shall comply with the requirements of the particular specification attached hereto and named: eThekweni Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13.

Pipe lengths shall be as scheduled in the Bill of Quantities.

Where a bell and spigot is specified, this shall comply with Figure below.



Steel fittings and specials to be grade X42 coated and lined to project specifications. Plate thickness shall not be less than 4.5mm, or the thickness that results in a working stress not exceeding 75% of the allowable maximum working stress for the steel grade.

For all branch connections the plate thickness of the barrel and branch shall be such that the maximum stress shall not be greater than that for an uncut pipe of the theoretical minimum thickness. Where it is more economical to provide external reinforcement in the form of collar type rings or crotch plates, these forms of reinforcement shall be used to achieve the same results

General handling of pipe needs to be such that pipe material will not be stressed and pipe lining and coating shall not be damaged.

#### PSL 3.4.2 Pipes of Nominal bore up to 150 mm

Delete the Sub-Clause.

#### PSL 3.4.3 Pipes of Nominal Bore over 150 mm

Delete the Sub-Clause.

#### PSL 3.4.4 Fittings and Specials

Add to the Sub-Clause:

The lining and wrapping of specials, which are to be butt-welded, is to be terminated 100mm from the end of the pipe. The lining of specials which are to be sleeve welded shall be taken to the end of the pipe and the wrapping is to be terminated 100 mm from the end. On flanged specials the wrapping and lining is to be taken to the end of the pipe.

Collars/bands shall be welded on to one or both ends of the bend, fitting or special for pipelines equal to or less than DN600 to accommodate the non-belled end of a pipe. The collars/ bands shall have a minimum width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, and a minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes. The collars shall provide an insertion distance the same as that of the connecting belled ended pipe. This will not apply where ends are to be jointed with adaptor joints.

Square, plain faced ends where slip-on flanges are to be welded to the special

All specials shall be protected in accordance with clauses PSL 3.9.8. All electrodes used for welding of joints shall comply with the relevant SANS standard.

Tee pieces shall be fabricated in accordance with Table 9 of BS 534 (1990). All other specials shall be fabricated in accordance with the relevant clauses of BS 534 (1990).

All even curvature bends shall be long radius and fittings for diameters up to and including DN200 shall be in accordance with ASME/ANSI, B16.9. unless otherwise stated in the Bill of Quantities or drawings.

All reducers to be cast reducers and shall be in accordance with ASME/ANSI, B16.9. unless otherwise stated in the Bill of Quantities or drawings. Any fabricated reducers shall be fabricated based on the formula: Face to Face length =  $(D-d)*4$  where "D" is pipeline diameter and "d" is the diameter of the water meter and shall not have more than two longitudinal weld seams.

Direction changes with bell ended pipe can be effected with a maximum deflection angle of 5 degrees. A direction change in the bell of a bell ended pipe will be treated as a straight joint and payment will be effected for such a direction change.

All steel bends, fittings and specials shall be fabricated to the dimensions and details shown on the drawings and/or described in the Bill of Quantities.

The bend, fitting, and special fabricator shall supply written confirmation that all hand welding was carried out by coded welders against appropriate welding procedures.

Bends, fittings, and specials DN300 and larger shall have the internal lining and external coating made continuous ("made good") as specified elsewhere for welded joints on coated and lined pipes.

Bends, fittings and specials shall be manufactured and tested in accordance with the specification for straight pipe and additionally with Section 18 of BS 534. The nominal dimensions of each bend, fitting and special required are itemized in the Bill of Quantities and/or on the drawings and 'exact length' tolerances shall be adhered to.

Bends shall generally be of the segmented (gusseted) type except where otherwise stated or shown on the drawings or where the Tenderer can offer a price advantage for supplying even curvature bends.

#### **PSL 3.4.4.1 Flanges:**

Add new Sub-Clause:

Use SANS 1123: 2007, Table 3 only. Where SANS 1123: 2007 (Table 3, for the different pressure classes) does not provide specifications for a particular diameter and class of flange, then specify BS EN 1092.

#### **PSL 3.4.4.2 Segmented Bends**

Add new Sub-Clause:

This clause applies to segmented bends equal to or greater than 300 mm in diameter. All segmented bends shall be fabricated in accordance with the criteria in Table 7.

For deflection angles up to and including 9 degrees, bends may be fabricated from pipe lengths "on site" in accordance with the Table below.

Deflection of Angle	
Up to and including 3 °	One pipe end scarfed on site
Exceeding 3 ° and up to and including 9 °	Mitre cut (two pipe ends scarfed on site)

Bends greater than 9° shall be fabricated at an approved pipe fabrication shop in accordance with the requirements of clause 21 of BS534:1990. Bends greater than 90° shall be fabricated from combinations of items from Table 7.

Shop drawings of bends, fittings and specials shall be submitted to the Engineer for approval prior to manufacture.

All flanged bends, fittings and specials shall be hydraulically tested at the fabricator's premises to the same pressure that they will be subjected to during the hydraulic testing of the completed pipeline. No visible signs of leakage will be permitted.

All segmented bends shall be fabricated in accordance with the criteria in Table 7.

**Table 7:**

<b>Total deflection angle</b>	<b>Number of segments</b>	<b>Number of Welds</b>	<b>Number of scarf cuts</b>
0 to 3 degrees	N/A	1	1
Greater than 3, equal or less than 9	N/A	1	2
Greater than 9, equal or less than 15	2	1	0
Greater than 15, equal or less than 30	3	2	0
Greater than 30, equal or less than 45	4	3	0
Greater than 45, equal or less than 60	5	4	0
Greater than 60, equal or less than 75	6	5	0
Greater than 75, equal or less than 90	7	6	0

The pipe manufacturer shall obtain and make available to the Employer's Agent a certificate or certificates from the steel manufacturer covering all steel used, showing by which process the steel was made and giving the chemical analysis of the steel and its physical properties. A record shall be kept of pipe serial numbers and the cast numbers of the steel used.

#### **PSL 3.4.5 Puddle Collars And Anchoring Flanges (New Sub-Clause)**

Add new Sub-Clause:

Puddle collars and anchoring flanges used as pipe anchorages shall be of the same diameter and thickness as the end flanges and shall be undrilled unless otherwise shown on the drawings. The anchoring collar/flange shall be capable of transmitting a longitudinal force 33% greater than the internal hydraulic pressure to be applied when testing, multiplied by the area of the bore and, under that condition, the stress in the material shall not exceed its yield stress.

The minimum distance of puddle flanges from reinforcement bars is 100mm to ensure that there is no current leakage between reinforcement and puddle flanges where cathodic protection systems are installed.

#### **PSL 3.4.6 Pipe material (New sub-clause)**

Add new Sub-Clause:

The Employer does not provide free issue pipe materials. Pipe supplied needs to comply with the requirements of the particular specification attached hereto and named: eThekweni Water and Sanitation: Departmental Specification for Steel Pipes 100mm to 2000mm Nominal Diameter: STPIPE v13.

#### **PSL 3.4.6 Pipe Material (New Sub-Clause)**

Add new Sub-Clause:

The Employer does not provide free issue pipe materials.  
Pipe supplied needs to comply with the requirements of the particular specification attached hereto.

#### **PSL 3.7 Ovality of pipe (New Sub-Clause)**

Add new Sub-Clause:

It is the Contractors responsibility to ensure that the ovality of the large diameter slender pipe remains within specified limits during construction. The maximum deflection of any of the pipe DN1000 and larger, shall not be more than 5.0% of DN, once all backfilling has been completed in accordance with this specification. For the cement mortar lined pipe the deflection shall be limited to 2.0%.

Should it be required, the Contractor shall utilise spiders of approved type and design to support the pipe during backfilling, in order to ensure that the pipe does not deform outside the specification tolerances and also ensuring that the internal lining of the pipe is not damaged.

#### **PSL 3.8 JOINTING MATERIALS**

##### **PSL 3.8.1 AC Pipes**

Replace Sub-Clause with the following:

Fibre Cement and concrete pipes

Jointing methods applied shall conform with the supplier/manufacturer's requirements

##### **PSL3.8.2 Flexible couplings**

Delete the Sub-Clause and substitute the following:

Where ordered, steel flexible couplings are to be of the "Viking Johnson"/"Klamflex"/"Aqualok" or similar approved type without central registers, each comprising one center collar, two special flanges, two rubber rings and hot dipped galvanized mild steel bolts. Steel couplings shall be assembled strictly in accordance with the manufacturer's instructions and all bolts shall be torqued to the value recommended by the manufacturer. On completion of hydraulic pressure testing of the installation, the entire joint shall be protected as described in the particular clauses for corrosion protection.

The tendered prices for laying and jointing are to include for the supply of all necessary materials, plant and labour to complete the joint.

Add the following as L 3.8.2:

Flexible couplings shall conform generally to Clause 15 of BS 534 for slip-on type couplings and shall be of approved manufacture, manufactured from rolled steel, and fitted with rubber rings suitable for jointing plain-ended pipes. They shall be capable of being tightened and released without damaging or improperly distorting the rubber seating rings

and shall be designed to prevent the rubber rings being blown out under pressure or sucked in under vacuum.

The rubber jointing rings shall be manufactured from first grade natural rubber to B.S. 2494 Class D. All bolts and nuts shall comply with SABS 135 or SABS. 136. Each sleeve shall be fitted with a centre register unless stated otherwise in the Project Specification.

Each coupling shall permit a repeated movement of 10 mm to cater for thermal expansion and contraction of the pipe, and allow for the following angular deflections:

- 6° up to and including 600 mm diameter;
- 5° over 600 mm up to and including 750 mm diameter;
- 4° over 750 mm up to and including 900 mm diameter;
- 3° over 900 mm up to and including 1 200 mm diameter;
- 2° over 1200 mm diameter.

The steel used shall conform to the appropriate British Standard Specification and each coupling is to be capable of withstanding the test pressure applicable to the pipes with which they are to be used without exceeding a stress in the steel of 67% of the yield point.

Couplings shall be protected by an approved epoxy coating system such as "Cupon KSIR88". The plain end of the steel pipe shall be properly prepared before corrosion protection so as to accept the flexible coupling.

### **PSL 3.8.2.5 Restrained flexible couplings**

Add new Sub-Clause:

Special restrained or anchoring flexible adaptor joints or flanged adaptor joints ("Viking Johnson" or similar) for connecting plain ended steel pipes to flanged joints are to be supplied complete with bolts, nuts, washers, gaskets, etc for connecting flanged joint to anchoring flange.

Anchoring or restraining flange to be welded approximately 300mm from plain end of pipe. Restraining flange adaptor to use minimum of 4 number grade 4.8 restraining bolts, equally spaced around circumference of flanges. Restraining flange to be to manufacturers specification and approved by the Employer's Representative.

### **PSL 3.8.3 Flanges and Accessories**

#### **PSL 3.8.3.1 Bolted connections (New sub-clause)**

All flanges, gaskets, bolts, nuts washers and other appurtenances required for the execution of the work shall be supplied and installed by the Contractor.

##### **PSL 3.8.3.1.1 BOLTED CONNECTIONS SHALL COMPLY WITH THE FOLLOWING:**

All pipes larger than 150mm diameter, connected to equipment or fittings, or where specifically indicated, shall be flanged to SANS 1123-2011 as amended, table 1600, 2500 or 4000 as scheduled. All flanges shall be truly at right angles to the axis of the pipe or fitting and shall be drilled with bolt holes off centre.

All plate flanges for welding shall be Type 3 and blank plate flanges shall be Type 8.

Puddle flanges shall be a minimum of the same diameter and thickness as the end flanges and shall be undrilled unless otherwise shown on the drawings.

All flanges, gaskets, bolts, nuts washers and other appurtenances required for the execution of the work under this Contract shall be supplied and installed by the Contractor under this Contract.

Any item of pipework that is found to have flanges that are incorrectly drilled shall be rejected. Reaming of bolt holes to oversize dimensions in order to make a particular piece fit shall not be permitted.

#### **PSL 3.8.3.1.2 GASKETS**

Gaskets shall be manufactured from “Klinger” or other approved material which complies with the requirements for Grade B of B.S. 2815.

All gaskets shall be 3 mm thick.

All gaskets shall be purpose made. Hand cutting and trimming of gaskets on site will not be acceptable.

Care should be taken to ensure that all gaskets are packed properly and are not damaged by bending. For larger sizes the gaskets shall be suitably supported by wooden frames during transit and while in store.

Gaskets are to be installed centrally without damage. No grease or other compound shall be used to hold the gasket in place prior to tightening the bolts. Ring Insert gaskets shall be installed after fitting the bottom half of the bolts and nuts loosely in order to ensure that the gasket assembly is centered properly. Full Face gaskets are to be centered by inserting bolts and nuts loosely around the circumference of the flange, at an even spacing.

The mating faces of flanges that are to be in contact with gaskets shall not be painted or coated. After application of all pipe and flange coatings, there shall be no runs or drips on the mating face and, where applicable, the flange profiling shall be clearly visible. After blast cleaning the mating faces shall receive one coat of rust inhibitor (Plascon Rustrix 84 or equal approved). There shall be no coating build-up in the flange bolt holes that could snag the bolts.

#### **PSL 3.8.3.1.3 MATCHED FLANGES**

Matched flanges shall correspond in construction and dimensions to flanges on equipment. Matched flanges shall be provided with the correct bolts, nuts and packing rings. All peening shall be clean before connections are made.

The faces of flanges that are in to be in contact with gaskets shall be masked and shall not be painted or coated. The mating flange shall then receive one coat of rust inhibitor (Plascon Rustix 84 or equal approved). Care shall be exercised to ensure that after the application of all coatings there are no runs or drips on the mating surfaces of the flanges and that the flange profiling is clearly visible over the entire face. Excessive coating build up in flange bolt holes that could snag bolts will not be permitted.

#### **PSL 3.8.3.1.4 INSULATING FLANGES**

Insulating flanges shall comply with the requirements of eThekweni Water and Sanitation .

Bolts, nuts and washers used on insulated flanges shall be as for the steel flanges shown on the standard drawing.

Bolts and nuts connecting mild steel flanges to stainless steel flanges, or stainless steel flanges to stainless steel flanges shall be Grade 304 stainless steel.

**PSL 3.8.3.1.5 BOLTS**

Bolts and tie bolts to be grade 4.8. Bolts, nuts and washers shall be hot dipped galvanised to SANS 121:2000/ ISO 1461:1999.

All bolts are to be tightened in a predetermined pattern with opposing bolts being tightened sequentially. When all bolts are tight, each bolt is to be torqued to the required/recommended torque in a predetermined pattern with opposing bolts being tightened sequentially.

All bolt threads shall be liberally coated with "Copper slip" or similar approved compound prior to assembly. Upon completion, bolt heads, washers and nuts shall be wrapped with the "Denso Mastic Blanket System" as described in elsewhere.

The length of each bolt shall be such that, after the bolt has been tightened, the end of the bolt is flush with the outside of the nut, or projects above the nut by a two full threads. Tie-bolts on restrained/anchoring couplings shall be fitted with "backing nuts" and washers.

**PSL 3.8.3.1.6 END COVERS**

Satisfactory temporary end-covers shall be provided by the Contractor for protection of flanges, prepared ends of open-ended pipes and fittings and screwed ends, to prevent damage to internal lining during transportation and during handling on site.

The end-cover on a pipe end or fitting shall remain in place during the entire installation process until the completion of a joint requires a cover to be removed.

**PSL 3.8.8 Joining Of Pipe With Plain End Conditions With Collar Welded Band (New Sub-Clause)**

Add new sub-clause

Pipe of nominal diameter, less than DN800, supplied with plain end conditions, shall be joined with the use of a band welded onto one end of the pipe where a joint is to be formed. The band is to form a socket type end condition with the pipe to be joined in a spigot and socket manner.

The collars/ bands shall have a width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, should this tolerance be required to be relaxed, this needs to be agreed with the Engineer and approved of by the Engineer.

A minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes.

The fillet weld where the band is welded to the pipe shall be a full fillet weld with no undercut.

The band shall be fitted with 50% of its width overlapping with each pipe end inserted into the band socket.

Weld procedures shall be developed for the welding of the band to pipe ends and for pipe joints made with fitted bands.

All pipe cut for the manufacturing of pipe specials to in lengths to suit, shall be joined with the collar welded method where a spigot and socket system as a result of an absent bell does not exist.

**PSL 3.9 CORROSION PROTECTION OF PIPELINES, FITTINGS AND PIPE SPECIALS**

Delete the sub clause.

All corrosion protection clauses for steel pipelines are shown in this specification as Particular Specifications for corrosion protection, attached under the particular specification section.

All metal surfaces shall be prepared and coated in order to ensure that no bare metal is exposed to ambient conditions which could lead to corrosion.

The cost of application of corrosion protection mechanisms are specified are deemed to be included in rates for laying of pipe and fitment of specials and fittings and equipment.

Protection against electrolytic corrosion shall be in terms of the Employer's Particular Specifications.

**PSL 3.10 VALVES**

Add the following to end of the Sub-Clause

All valves shall be wedge gate valves to SANS 664 of type "AVK" / "VAG" or equal approved. Valves of size DN350 and larger, shall to be supplied complete with gearboxes. All Valves shall be anti-clockwise closing when the spindle is viewed from above and supplied with cap tops unless otherwise specified on the drawings or bill of quantities. All valves where the cap top is buried deeper than 0.5 m shall have a spindle extension installed with the valve unless otherwise directed by the Employer's Representative. All spindle extensions shall be hot dipped galvanised to SANS 121:2000/ ISO 1461:1999.

Types of valves required in the works shall be as stated in the schedule of quantities and on the drawings. Where a particular make of valve is stated the contractor may offer an equivalent alternative, provided full details are submitted at the time of tender. The decision of the Engineer on acceptance of offer will be based on technical details required and full compliance thereof.

From this sub-clause delete "SABS 1200 LK" and substitute the following:-

**PSL 3.10.1 Control Valves (New Sub-Clause)**

Add new sub-clause

The pressure reducing valve (PRV) and surge relief valve required shall be manufactured by Bermad, Bakers, Clayton and or other approved control valves suppliers, and shall comply with the following:

**General:**

- a) Each control valve and all other parts of the control valve assembly such as pilot valves, linkages, brackets, indicators, and all other components and everything necessary for the proper functioning of the control valve assembly shall be supplied and installed by the Contractor in accordance with the valve supplier's instructions and checked by a representative of the supplier after installation.
- b) Each control valve shall be suitable for operations under pressures of class 16 or greater
- c) Each control valve assembly shall then be commissioned and tested by the Contractor by using it to perform all of its automatic functions, as described below, in the presence of the Engineer and a representative of the firm which supplied the control valve to the Contractor.

- d) After satisfactory testing and commissioning of each installation, the control valve assembly shall be demonstrated and explained to a representative of the Employer, attending on the Site for this purpose, who is to be handed five copies of the Manufacturer's drawings and operating instructions prepared by the supplier of the control valve assembly.
- e) Each control valve assembly shall operate in the system indicated on the drawings and amplified by certain data set out below.
- f) The control valve assembly shall operate automatically and smoothly without attendance under all normal operating conditions.
- g) The control valve assembly shall be manufactured generally in accordance with SANS 1808-31 for automatic control valves and all components of the entire assemblies shall be made of specially selected corrosion resistant materials capable of withstanding the corrosive atmosphere which will exist in the pipe, valve chamber and structure.
- h) The interior surfaces of the control valve shall be coated with an approved epoxy compound similar or equal to KSIR 88.
- i) The control valve shall be fitted with an indicator to give visual indication of the position of the main diaphragm (i.e. to indicate the degree of the opening or closing of the valve).
- j) Approved strainers that can easily be cleaned, shall be supplied and installed on all pilot piping to protect the small ports from becoming clogged with grit.
- k) After acceptance of his tender, the Contractor shall obtain for the Engineer from the valve supplier, fully dimensioned drawings of the whole control valve assembly in triplicate, together with illustrations and the curves referred to above.

#### **PSL 3.10.2 Scour Valves (New Sub-Clause)**

Add new sub-clause

Scour valves shall be Wedge gate valves to SANS 664 and shall comply with eThekwin Water and Sanitation specifications.

#### **PSL 3.10.3 Isolating Valves (New Sub-Clause)**

Add new sub-clause

Isolating Valves shall be Resilient Seal Valves to SANS 664 and Butterfly Valves and shall comply with the following:

Shall be flanged in accordance with the specified pressure rating

Shall be of a Wafer type

Flange to flange dimension shall not exceed 100mm

Shall be supplied by a Manufacturer approved by eThekwin Water and Sanitation (e.g. Oreg, Amri, Gonec, JMC and AVK). Other Manufacturers to be pre-approved by the Employer.

#### **PSL 3.10.4 Air Valves (New Sub-Clause)**

Add new sub-clause

Air Valves shall comply with eThekwin Water and Sanitation specification and drawings

#### **PSL 3.11 MANHOLES**

Add to Sub-Clause:

**PSL 3.12 METERS (NEW SUB CLAUSE)**

Add to clause.

All meters are to be in accordance with the meter particular specifications.

**PSL 4 PLANT****PSL 4.1 HANDLING AND RIGGING**

Add to Sub-Clause:

The Contractor shall supply, operate and maintain an adequate fleet of vehicles including cranes to be used for the safe conveyance of the pipes, specials and fittings. The pipes and specials shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Agent.

During transport, the pipes and specials shall be supported on suitable pipe saddles such that all pipes and specials shall be separated so as not to bear against each other and shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Agent.

When handling 12m pipe lengths or longer, the pipes shall be lifted with band slings (minimum 300 mm wide) placed centrally around pipe at two points 6 metres apart.

For flexible pipe handling the maximum pipe deflections shall never exceed that stated under clause PSL 5.1.1 .

**PSL 5 CONSTRUCTION****PSL 5.1 LAYING****PSL 5.1.1 General**

Add to the Sub-Clause:

The Contractor will be held fully responsible for the care and safety of all pipes and fittings, etc, on site, and shall bear the cost of all renewals, which may be necessary to make good losses, damages or breakages. Furthermore, he shall be fully responsible for handling and re-loading material at the storage areas and for transporting and offloading of all such materials to the Site of the Works."

Pipe upliftment from pipe yards, transportation and stringing next to pipe trench for laying shall conform with the requirements of this specification.

During transport, the pipes and specials shall be supported on suitable pipe saddles such that all pipes and specials shall be separated so as not to bear against each other and shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Representative.

The use of bare cables, chains, hooks or narrow skids will not be permitted and the

Contractor shall supply canvas slings and padded skids and ramps of a sufficient width to prevent damage to the protective coating. The dragging or skidding of pipes and specials in contact with the ground shall not be permitted.

Pipe shall be handled to ensure that no structural damage take place on any pipe or fitting at any stage.

Assembled PVC and HDPE pipe shall be protected for temperature variations in order to ensure that shrinkage as a result of temperature drops do not result in spigots withdrawing from sockets after having been inserted to the required depth.

### **PSL 5.1.2 Damage**

Add the following to L 5.1.2:

All pipes, specials, valves and fittings shall be carefully examined by the Contractor for internal and external damage at the following stages:

- a) on arrival at laying site;
- prior to laying;
- after laying;
- prior to backfilling; and
- during backfilling.

All damage or defects of any kind shall be repaired by the Contractor and to the satisfaction of the Employer's Representative or an appointed third party inspection authority immediately after detection at any of the above inspections.

Where, in the opinion of the Employer's Representative, satisfactory repairs are not practicable, the damaged materials shall be replaced by the Contractor at his own cost.

### **PSL 5.1.3 Keeping Pipelines Clean**

Add to Sub-Clause:

The Contractor shall ensure that all pipe work is installed internally free of any contaminants. All traces of dirty water, slag, splatter, swarf, cuttings, coupons, welding rod ends, grinding dust, dirt and other debris are to be removed from the inside of the pipe as it is installed.

The Contractor shall ensure that all dust, grit and powder that accumulates in the pipe as a result of grit blasting for the repair of internal linings, be removed from the pipe in an acceptable manner before the internal lining repairs are carried out.

Once the lining repair has been completed, cleaned off and inspected, that specific section of the pipe shall be blocked off to prevent any further access by workers.

The Contractor shall take note that flushing of the completed pipeline may not be allowed after construction has been completed and therefore clean house keeping practices will be required under all circumstances during construction. The tendered rates for pipe laying shall include for the clean house keeping practices required.

Each section of the pipeline is to be internally inspected and passed by the Engineer once construction has been completed. If the pipework is not satisfactory, the Contractor shall re clean the pipe at his own expense until the pipe is passed clean. The Engineer reserves the right to utilize cameras or any other means to inspect inaccessible areas.

For small diameter pipes, the Engineer shall be afforded the opportunity to inspect internal cleanliness as pipe laying progresses.

**PSL 5.1.3.1 Cleaning valves and fittings (New sub-clause)**

Add new Sub-Clause:

All flanges, valves, fittings and equipment are to be installed in pipe work only after they have been thoroughly cleaned. Flange faces shall be checked for damage before being incorporated into the permanent works and any damage shall be reported to the Engineer.

**PSL 5.1.3.2 Inspection of Pipe Internals**

Add new Sub-Clause:

All possible care shall be exercised during construction in order to avoid damage being inflicted to the pipe lining as a result of the installation and welding activities, and the following procedures shall be adopted at all times:

Wet sacking or rubber matting shall be placed on the pipe invert in the areas where welding or flame cutting operations are in progress to minimise the extent of damage to the lining from weld splatter or molten metal from flame cutting. This requirement shall be strictly enforced.

Tools shall be placed on rubber foam or resilient rubber matting to protect the pipe lining against mechanical damages.

Particular care is to be taken inside the pipe when tie-ins into the pipe is done for the purpose of fitting air valves, scour valves, by-passes and other tie-ins.

The rates tendered in the Bill of Quantities shall include for all the measures required under this clause.

Each section of the pipe work is to be internally inspected and passed by the Employer's Representative, once construction has been completed. If the pipe work is not satisfactory, the Contractor shall clean the pipe at his own expense until the pipe is passed as clean. The Employer's Representative reserves the right to utilize cameras or any other means to inspect inaccessible angles.

**PSL 5.1.6 Equipment For Inspecting Internal Surfaces Of Pipes (New Sub-Clause)**

Add new sub-clause

**PSL 5.1.6.1 CCTV**

Weld Inspections

Immediately after the weld has cooled it is to be visually inspected both internally and externally. Internally the welds are to be checked with a suitable CCTV camera, if it is too small for physical entry. (Assuming welding of root welds were from outside the pipeline)

The internal surface of the pipe is also to be checked for any local damage. Internal and external photographs of the joint repair and weld are to be taken from 4 different angles at approximately 90° spacing, identified with adjoining pipe numbers and recorded. Weld and internal lining approval is to be signed off by representatives of the Contractor and Engineer.

The equipment shall be kept in good condition and operating order throughout the duration of the Contract. No separate payment will be made for this equipment and the costs therefore will be deemed to be included in the tendered rates.

Any defects of the weld or internal lining repair must be fixed in accordance to the specification and inspected again with a CCTV camera at the Contractor's expense

**PSL 5.1.7 Pipe Supports (New Sub-Clause)**

Add new Sub-Clause:

Temporary pipe supports may be used to assist setting up and assembly. However permanent pipe supports should be installed as soon as possible to minimize double handling and/or omission during construction.

Permanent pipe supports shall be constructed as indicated on the drawings or as directed on site.

Before testing, all permanent supports shall be complete and all temporary supports removed, unless otherwise agreed by the Engineer.

**PSL 5.1.8 End Caps (New Sub-Clause)**

Add new Sub-Clause:

The Contractor shall, at the end of each day's work, fit end caps to the open ends of the pipeline under construction. The end caps shall be manufactured in such a manner that it can be fitted to seal off the pipeline to the extent that it is totally dust and waterproof. The end cap must be able to withstand a pressure of 5.0m head of water externally when fitted. End caps shall be maintained during nonworking periods.

Notwithstanding the requirement for end caps, the Contractor remains responsible for preventing pipe being laid from floating during wet conditions. The Contractor remains responsible for dealing with water.

The tendered rates for the laying of pipe shall be deemed to include for the supply, fitment, and maintenance of the end caps.

**PSL 5.1.9 Marker Posts (New Sub-Clause)**

Add new sub-clause

Pre-cast concrete marker posts as shown on the drawings shall be set at all horizontal direction changes and where otherwise indicated by the Engineer.

The standard marker post rate shall include the supply and erection of painted, inscribed posts. The rate shall be inclusive of supply, erection and shall include for all necessary excavation, mass concrete footing and formwork.

**PSL 5.2 JOINTING METHODS****PSL 5.2.1 Detachable Couplings (AC And Upvc Pipelines)**

Amend Sub Clause to reflect as follows:

Replace reference to "AC" with "Concrete" or "Fibre Cement" as is applicable.

Allow "uPVC" to refer to all PVC pipe derivatives namely "u", "O" and "M".

**PSL 5.2.2 Flanged Joints**

Add to the Sub-Clause:

Before being brought together, the ends of the pipes, fittings, couplings and flanges are to be inspected and cleaned to ensure that all parts forming the joint are undamaged and clean.

When jointing flanges, the faces shall be cleaned thoroughly and approved jointing material (compressed fibre cement or other approved gaskets on flanged joints), cut properly to size, is to be inserted immediately before bringing the two flanges together. Before closing the joints, the flanges must be parallel to each other, with all bolts inserted in the bolt holes. After the fittings have thus been aligned and well supported, the joint shall be bolted up to a uniform tightness using torque wrenches to achieve the required compression force on the gasket. Diagonally opposing bolts shall be tightened sequentially.

If and where full face gaskets are used, the jointing material shall be flush with, or protrude beyond, the outer circumference of the flange (this is not applicable to raised face flanges). On completion of the joint, the flanges and bolts shall be protected as described in the particular specification for corrosion protection of flanged joints.

Flanges to fittings or joints will generally be to SANS 1123. It is possible, however, that the Employer may supply valves with flanges which have not been drilled according to these standards. The Contractor shall be responsible for checking the flange drilling of all fittings supplied by the Employer and for supplying flanges drilled to match. No additional payment is to be made for this work and the Contractor is to allow for such in his rates.

Contractors are to allow in the rates for the supply and installation of mild steel pressed washers (two per bolt) for all flanged fittings. The washers shall have an ID of 2 mm greater than that of the bolt. Tenderers are to ensure that the length of the bolt includes allowance for the washers.

All bolts, nuts and washers to be in accordance with PSL 3.8.8.

Wherever loose or slip on flanges are welded onto pipelines, the Contractor shall ensure that the flange is lined and coated to project specifications and that all repairs to the lining and coating are in accordance with the project specification.

### **PSL 5.2.3 Welding Steel Pipelines DN600mm Or Greater**

Delete the title and replace with

**“Welding (Steel Pipelines)”.**

Delete the 1<sup>st</sup> sentence and replace with:

Unless otherwise indicated on the drawings, field jointing of Bell-ended pipe by fillet welding is required. Field joint of bevelled ended or plain ended pipelines equal to or less than DN600 require collars/bands to be welded to the ends of the pipelines.

The collars/ bands shall have a width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, and a minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes.

Field welding of steel pipelines shall be carried out in accordance with the relevant requirements of the latest version of API 1104. The Contractor, prior to commencement of welding, shall produce a qualified welding procedure in accordance with the latest version of API 1104, for the intended sizes, processes, positions and consumables to be used on this project.

Welding shall be carried out by welders who are competent in terms of the procedure approval test given in API 1104. Prior to commencement of welding, the current

qualification of each welder must be produced in accordance with the welding procedure. Should constant repairs be required on welds carried out by one particular welder, the Engineer may request that the welder be re-tested or removed from the project.

Add to the Sub-clause:

### **Examination of Welds**

The Contractor shall include in his prices for the manufacture and/or laying of pipes, bends, fittings and specials for the cost of carrying out, under the supervision of an inspector appointed by the Employer, examination of welds on the following basis:

- a) Manufacture of Pipes (Not applicable to pipes supplied by the Employer)
  - i) FIVE percent (5%) random radiographic examination of all welds deposited by an approved automatic process.
  - ii) TEN percent (10%) random radiographic examination of all welds deposited manually or semi-automatically, and repairs to welds done by an automatic process (should repairs exceed 25% of the tests the percentage of examination shall be increased to 20%).

#### **Field Welds**

Radiographic testing will be performed on butt welds and dye penetrant testing on fillet welds. Welds will be tested and adjudicated in accordance with API 1104 and will be tested with the following frequencies:

The first 10 welds executed by each Welder will be tested. Thereafter, 100% of all further welds will be tested, with no random sampling or reduced testing frequency. If no discontinuities are discovered, 25% of his/her further welds, chosen at random by the Engineer, will be tested. If during the 10% testing, discontinuities are discovered both welds immediately adjacent to the defective weld will be tested. If these joints are found acceptable testing will remain at 100%. If, however, defective welds continue to be evident, testing will be increased remain at 100% with no reduction in the testing frequency. Only once the welding has returned to an acceptable standard and at the discretion of the Engineer, will the percentage be reduced again.

Repairs of welds will be permitted in accordance with approved repair procedures. Repairs shall be re-examined using the relevant non-destructive testing method. All costs associated with the repair of defective welds will be borne by the Contractor.

#### **Welds in Fabricated Bends, Fittings and Specials**

- iii) ONE HUNDRED percent radiographic examination of all weld deposited manually or semi-automatically in bends, fittings and specials which cannot be hydraulically tested because they have a plain end.
- iv) ONE HUNDRED percent radiographic examination of all welds deposited manually or semi automatically in all flanged bends, fittings, and specials which are to be tested hydraulically.

The Engineer shall in all cases determine which welds are to be radiographed on the quantity basis specified above. All radiographs and records thereof made by the Contractor shall be made available to the Engineer to enable him to determine whether the welds are acceptable or not and no lining or wrapping of pipes shall be permitted until the welds have been accepted by the Engineer. To avoid any unnecessary delays, at the option of the fabricator, radiographs may be approved by the manufacturer's inspectors subject to them being subsequently submitted to and approved by the Engineer.

When a section of the weld is shown by radiography to be unacceptable, and if the limits of the deficient weld are not defined by the radiograph, additional radiography shall be carried out at the Contractor's expense until the limits of the deficiency are determined.

Repairs shall be re-examined using the relevant non-destructive testing method. All costs associated with the repair of defective welds will be borne by the Contractor. All repair welds shall be identified with a stamp marking, indicating which welder conducted the repair. Repaired welds shall be radiographed at the Contractor's expense but, after any repair welder has had ten consecutive repairs approved, the extent of the radiography of the repairs conducted by the welder may be decreased by agreement between the Engineer and the Contractor.

In the event of any welded joint proving unsatisfactory when the pipeline is subjected to the radiographic, dye penetration or hydraulic tests, the Contractor shall be held responsible for all costs involved in repairing the joint or cutting it out and welding in a new section of pipe, as may be ordered by the Employer's Representative, thereafter restoring the lining and wrapping, if these have become damaged, all to the satisfaction of the Employer's Representative.

After jointing and testing, the protective lining and wrappings are to be rendered continuous in the manner specified. Holiday detection tests shall be carried out in the field to ensure continuity of lining and wrapping.

### **PSL 5.2.3.1 Production Testing of Welds**

(Not applicable to pipes supplied by the Employer)

The Contractor shall also include in his prices for the supply of pipes the cost of carrying out at the factory, non-destructive tests of shop production welds (additional to the qualification tests for welding procedure) on the following basis:-

One pipe from each 30 pipes produced shall be selected at random and specimens for two guided cold bend tests and one transverse tensile test shall be cut therefrom and tested in accordance with SANS 719, Section 7.

In the case of the guided cold bend tests, where welding is carried from one side only, bend - specimens shall be tested with the rest of the bend in tension; where welded from both sides the specimens shall be tested with the inner and outer welds in tension alternately.

Tensile tests shall be carried out as for the qualification tests.

The pipes from which successfully tested specimens have been taken shall be trimmed to the maximum possible length and shall be accepted by the Employer for payment purposes as full standard pipe lengths.

In the event of the welds of any pipe failing to reach the standard of acceptance, such pipe shall be rejected. Two further plate coupons shall be prepared from different pipes, selected at random by the Engineer, for each specimen that has failed to reach the required standard. In the event of such additional tests proving to be satisfactory repairs to the pipe originally failing any test will be permitted by the Engineer and such repairs and subsequent re-test shall be at the Contractor's expense. In the event of the additional tests also failing to reach the required standard the Engineer shall have the right to reject the entire batch of pipes from which the coupon plates were cut.

### **PSL 5.2.3.2 Welding procedures and welding staff:**

The qualification tests for welding procedure shall be carried out generally in accordance with the requirements of API 1104: The detailed procedure to be adopted during manufacture shall be established. Prior to commencement of welding, the current qualification of each welder must be produced in accordance with the welding procedure. Should constant repairs be required on welds carried out by one particular welder, the

Employer's Representative may request that the welder be re-tested or removed from the project.

The Contractor shall maintain a record of all welders employed on the works giving particulars of each individual welder's qualification tests carried out in terms of API 1104, the cost of which shall be borne by the Contractor. Qualification testing of welders shall be conducted in the presence of the Employer's Representative or his representative.

Before a welder is employed on tack or root welds, he shall carry out a test tack and root weld on a pipe of the same materials and under conditions as close as possible to those experienced on the actual pipeline.

The tests are to be carried out either before manufacture of the pipes to be supplied under this contract is commenced or before the manufacture of pipes in excess of a number previously agreed by the Employer's Representative is carried out.

The coupon plates shall be prepared either from plates of the same material as the pipe and welded in a similar manner to that to be used during production, or by cutting suitable specimens from a pipe selected at random by the Employer's Representative from the first production pipes. The coupon plate for the tensile weld test and those for the guided cold bend tests shall be prepared in accordance with the requirements of SABS 719.

The qualification tests shall be considered satisfactory if:

- a) The weld has a joint efficiency greater than 95% of the minimum specified tensile strength of the parent metal and,

the bend test specimens are capable of being bent around a former with a diameter equal to six times the nominal thickness of the plate to an angle of 180 degrees without developing a crack, except at the arises of the specimen, of length or width greater than 3 mm.

Failure to pass the above qualification tests shall result in the rejection of any pipes welded with the procedure used and the preparation of a new qualification of procedure test.

Any changes in the electrode case type used or change of flux used shall require a qualification test before approval of the procedure is granted.

### **PSL 5.2.3.3 Welding Procedure**

All welding shall conform to the approved welding procedures, which must be submitted to the Employer's representative for approval.

The minimum number of root bead welds, the minimum number of second bead welders and the type of clamp used (internal or external) shall be given in the description of the welding technique as specified above.

All welding procedures shall incorporate the power brushing of all welds after having deposited each and every layer. It is a condition of this specification that each and every weld run be power brushed before the next run is deposited.

Welding shall not be performed under conditions that could affect the quality of the welded joint (e.g. high moisture or windy conditions). Wind and rain shields may be used where practical.

**NOTE: Should the Contractor want to utilize shorter lengths of pipe than those supplied, for construction purposes, in order to work in confined areas, a detailed method statement in motivation for such cutting, shall be submitted to the Employer's Representative for approval. Pipes shall not be cut into shorter lengths for construction purposes, unless approved by the Employer's Representative. The costs associated with any additional welds at joints, as a result of cutting pipes into**

**shorter lengths as approved by the Employer's Representative, shall be borne by the Contractor.**

#### **PSL 5.2.3.4 Quality control**

Add new Sub-Clause:

Records of which welds were carried out by each individual welder as well as the respective results of non-destructive testing shall be submitted to the Employer's Representative at each monthly site meeting. Should there be repetitive or serious welding defects, this information shall be forwarded to the Employer's Representative immediately.

Each weld and welder shall be given a unique number which shall be logged against each weld. This data will be used for reference on construction records, drawings, reports, radiographs and NDT records.

#### **PSL 5.2.3.5 Weather conditions (New Sub-clause)**

Add new Sub-Clause:

Welding shall not be performed under conditions that could affect the quality of the welded joint (e.g. high moisture or windy conditions). Windshields may be used where practical.

#### **PSL 5.2.3.6 Field Welding:**

Where scarf cutting of the pipe ends is required in the field the pipe ends shall be prepared by machining or machine flame cutting. Hand flame cutting shall not be permitted except under the following circumstances

Steel pipes may be cut by hand flame as follows:

In the case of cement lined steel pipe, the cement lining shall be chipped back 50 mm after the initial cut and the pipe then re-cut  $\pm 10$  mm from the original cut in order to remove any "blow-back".

In the case of epoxy lined steel pipe, all damaged lining shall be removed and reinstated in compliance with the Clause 3.9.

All flame cuts shall be made good by grinding to form the correct gap between steel sections prior to welding.

Bevels may be cut by flame provided they are made good by grinding.

When jointing pieces by butt-welding the number of tack welds applied shall be kept to a minimum to be effective in holding the pipe ends securely and to maintain the required root gap prior to welding, but shall in any case be not less than four.

#### **PSL 5.2.3.7 Clearance (New Sub-clause)**

Add new Sub-Clause:

The minimum clearance around the pipe during welding shall be 500mm or such other minimum distance that may be required to facilitate compliance with the approved welding procedure. When welding in the trench, adequately sized "fox holes" shall be excavated / formed so as to provide adequate access for the welders.

Excavation for fox holes shall be deemed to be included in the rates for pipe trench excavation.

**PSL 5.2.3.8 Visual Inspection**

Add new Sub-Clause:

100% of each joint will be examined and the following criteria met:

All welds shall be substantially uniform in appearance with the inner and outer weld beads not exceeding 1 mm and 3 mm respectively in height above the pipe surface.

The weld, heat affected zone and surrounding parent metal shall be free from cracks, porosity and trapped slag.

All weld splatter must be removed prior to the application of corrosion protection.

**PSL 5.2.3.9 Welded Attachments:**

Where it is necessary to weld attachments to pipe work (e.g. Cathodic Protection Lugs and Pipe Support Brackets and Trunnions) the material of the attachment is to be compatible with the pipe work and be welded on by an approved welder using approved welding procedures.

Welded attachments onto pipe work are to be subjected to the same level of NDT as the pipe work.

**PSL 5.2.3.10 Screens for Welding**

No welding or cutting equipment liable to cause sparks or flashes shall be used at or above ground level unless the operation is carried out within a suitable enclosure, or unless suitable screens are erected in order to shield passers-by from the emitted light and/or sparks.

**PSL 5.2.3.11 Aligning**

Add new Sub-Clause:

The alignment of abutting ends will be such that the offset does not exceed 1.5 mm. Line up clamps may be used for joint "fit-ups."

"Dogs" and wedges for the alignment of pipe work for butt when fitting up before welding, shall not be allowed as a rule. Should the Contractor require to use "dogs" and wedges, approval from the Employer's Representative shall be obtained. The Contractor shall, upon removal of any "dogs" and wedges pay attention to the following repair requirements:

Where "dogs" and wedges have been removed from the pipe, the damage to the metal surface of the pipe shall be ground clean.

The required number of welding runs shall be performed in order to fill the hole with welded material.

The filled area shall be ground smooth in order to ensure that the repaired area is level with the original pipe material.

A dye penetrant test or whichever is most applicable, shall be executed on the repaired area before repairing the external coating.

The repair to the outer coating shall be effected in terms of the accepted procedure for coating repair.

The repair to the inner lining at the point of removal of "dogs" and wedges shall be effected in terms of the accepted procedure for lining repair.

**PSL 5.2.3.12 Manufacturing of Crotch, Saddle Plates, Wrappers and Gussets**

The Contractor shall pay careful attention to the detail when crotch and saddle plates, and/or gussets and wrappers are manufactured. All plate material for any one of these items shall, where it has to be welded together or welded onto pipe specials, be bevelled to the extent that full penetration welds would be possible under all circumstances. The Employer's Representative is to be requested to inspect all applicable fit ups for approval, before welding commences. (This is required for workshop fit ups as well as field fit ups). 100% NDT testing or other applicable test methods will be required on all welds to crotch and saddle plates, gussets and wrappers. The tendered rates for the manufacturing of pipe specials which require crotch plates, saddle plates, gussets or wrappers, shall be deemed to include for all the material to be supplied, the welding and NDT testing as required by this specification.

All Crotch plates are to be manufactured from Grade X42 steel plate or Grade 300WA steel plate for all sectors.

Saddle plates and Wrappers shall be manufactured from pipe supplied by the Employer as Free Issue material (here after called donor pipe material). The saddle plates and wrappers shall be manufactured from the same grade of donor pipe and the same diameter as the pipe on which the saddles or wrappers are to be fitted. Coating on the pipe, onto which saddles or wrappers are to be fitted, shall be removed and saddles or wrappers shall be cut from the donor pipe material to the required dimensions. The donor pipe material shall be slightly heated and then hammered into shape onto the accepting pipe in order to take up the required diameter.

All saddle plates are to be manufactured from free issue pipe material of same DN and grade as the main pipe, in terms of the drawings for the specific pipe special.

All crotch plates are to be manufactured from material procured by the Contractor, in terms of the drawings for the specific pipe special.

**PSL 5.2.3.13 Pipe DN800 and smaller**

The requirements of PSL 3.8.8 shall be met.

**PSL 5.2.5 Cut Pipes (New Sub-Clause)**

Add new Sub-clause:

Cut pipes shall be used where required as closure lengths. The cut ends shall be prepared in accordance with clause 5.1.5 of SANS 719. The finished dimensions of ends cut on site must be within the tolerances applicable to the ends of the particular types of pipe to be laid. The cost of cutting and trimming of pipes shall be included in the rates tendered for laying and jointing pipes.

In the case of bell end steel pipe DN600 and smaller, where pipe is cut on site to suit the length required, and the length of the off-cut is 1 metre or longer, then a collar shall be welded on to one end of the off-cut such that it may be used in the remainder of the pipeline. The collars shall be fabricated from flat plate of the same steel grade and of thickness not less than 4mm greater than the wall thickness of the pipe to which it will be welded. The collars shall provide an insertion distance the same as that of the connecting bell ended pipe.

**PSL 5.2.6 Jointing Of Upvc Pipe Sections And/Or Fitment Of Special Fittings (New Sub Clause)**

Add new sub clause:

All spigot and socket joints of uPVC pipe and fittings shall be installed according to SANS 966 and comply with manufacturers requirements and fittings.

Before any joint is made the spigot end to be inserted into the socket shall be measured and marked in order to show the depth of insertion required of spigot and socket. The mark shall be clear and permanent enough to ensure that it is visible once jointing is complete. The mark shall be made 5mm further from the end of spigot than the required insertion depth in order to be able to see the mark 5mm from the socket end once inserted into the socket.

Every socket shall be checked to ensure that it is free of grit, sand and debris or foreign material before spigot end is inserted.

Spigots shall be free from burrs before fitment.

Chamfers on the spigot end shall be uniform to approximately 15 degrees and must occur around the external circumference of the pipe to approximately half of the wall thickness.

Rubber rings shall be clean and free of stones and grit.

The quality plan to be developed for pipe jointing shall allow for checking of each and every joint by the pipe installations supervisor before a joint is done.

No deflection will be allowed between two pipe sections or pipe and fitting sections at the joint.

The quality plan to be developed for pipe jointing shall allow for checking of each and every joint by the pipe installations supervisor before a joint is done.

No jointing shall be effected with the uses of a PVC glue.

### **PSL 5.3      SETTING OF VALVES, SPECIALS AND FITTINGS**

Add the following:

Valves and fittings shall be installed in accordance with the manufacturer's instructions. Where valves are supplied by the Employer at Municipal depots they shall be collected by the Contractor at such depots and transported to the laying site.

Valves are to be set correctly in the positions indicated and supported on concrete stools, except where not so required by the Employer's Representative and shall be installed with their operating spindles vertical. Valve spindle guide brackets and stays where provided shall be secured into position against concrete work and these must be set and carefully adjusted in order to give true vertical alignment of the spindle. The Contractor shall supply the insertions and bolts necessary for the installation of the valves.

#### **PSL 5.3.1      The Storage, Commissioning And Installation Of Butterfly Valves**

Add new Sub-Clause:

Butterfly valves shall be stored, installed and commissioned so that the valve blade seal is protected at all times from oxidation, ozone attack and the ingress of dirt. All butterfly valves are to be installed such that the disc is installed horizontal to the flow direction with the hand wheel on the right-hand side of the flow direction.

**PSL 5.3.1.1 Storage**

Add new Sub-Clause:

The valve is to be stored in the vertical position.

The valve should be stored in the cracked position (i.e. not shut).

The valve should not be stored in the vicinity of electrical equipment.

The valve should be stored under cover and protected from temperature extremes.

**PSL 5.3.1.2 Installation and commissioning (New sub-clause)**

Add new Sub-Clause:

Prior to the installation of the valve, all dust and dirt should be washed off the valve, particularly the seal, seat and any tapped holes in the valve body.

The seals of all valves shall be checked for complete closure when the valve blade is in the fully closed position. (See seal adjustment below).

The valve must not be lifted by the hand lever, valve actuator or the handwheel.

The valve must not be used for lining up the pipework.

The valve should be left in the fully open position after installation and prior to commissioning of the system.

The valve is to be installed such that the disc opens in the direction of flow and is horizontal to flow.

The valve is to be installed such that the hand wheel is on the right-hand side of the pipeline in the direction of flow

**PSL 5.3.1.3 Seal adjustment (New sub-clause)**

Add new Sub-Clause:

To adjust the seal, a 0,004" feeler gauge and an Allen key are required.

With the valve in the fully closed position, it should be possible only with difficulty to introduce the feeler gauge between the valve blade seal and the seat.

If, due to seal movement during storage the feeler gauge can easily pass between the seal and seat, then the clamp ring socket head cap screws in the vicinity of the gap should be finger tightened with the Allen key so as to push the seal out and close the gap.

**PSL 5.3.4.1 Payment**

All costs incurred for the seal adjustment as stipulated above shall be included in the respective rates for installation of the valves.

**PSL 5.5 ANCHOR/THRUST BLOCKS AND PEDESTALS**

In the fourth line of the Sub-Clause delete "15 MPa/37,5 mm" and replace with "20/19"

Add to the Sub-Clause:

For continuously welded or flanged steel and HDPE pipeline anchor/thrust blocks are not required except where specifically shown on the drawings and scheduled in the Bill of Quantities.

For PVC pipe, anchoring is required at all directional changes, at all valves, all stops and reducers. Where anchor points are in direct contact with the pipe for example bends, the bend shall be protected by means of a layer of plastic sheeting of minimum 250 microns thick. The rate for anchor block installation shall be deemed to include for this requirement.

Concrete pressure pipe shall be anchored at all directional changes, at all valves, all stops and reducers.

## **PSL 7 TESTING**

### **PSL 7.1 GENERAL**

Add to the Sub-Clause:

#### **Inspection**

Facilities shall be provided to the Employer's Representative so that he may be able to inspect, during the process of welding, any layer of weld metal. He may require any defective welds either to be cut out and re-welded or repaired at his discretion. The Contractor shall clean thoroughly all welds prior to inspection. The Employer's Representative may require a number of completed joints, selected at random, to be cut for mechanical tests or to be selected for visual inspection, micro examination or examination by other means. When the Employer's Representative orders the Contractor in writing to cut out and test joints the Contractor shall be paid for such work at day work rates.

If as a result of inspection and testing, the work of any welder is found to be unsatisfactory, the welder shall not be permitted to continue welding under this contract.

#### **Standards of Acceptability**

The completed welds shall comply with the requirements of Clause 6.0 of API 1104. Work on which unauthorised repairs have been carried out may be rejected.

#### **Repairs to Minor Faults**

Faulty welds shall be rectified in accordance with clause 7.0 of API 1104.

All costs relative to the repair of faulty joints, including removal and replacement of the backfill and making good the wrapping and lining shall be borne by the Contractor.

### **PSL 7.1.2 Non Destructive Testing (New Sub-Clause)**

Add new Sub-Clause:

The Company or individuals appointed to execute NDT testing shall have an approved accreditation with the National controlling authority and the Contractor shall allow for this in his rates for welding.

The standard method for Non-destructive Testing of butt welds is X-Ray testing. Under certain circumstances however, X-Ray testing of welds is not possible as a result of limited access. The Contractor shall allow in his rates for alternative test methods of welds where required (Example: Ultrasonic, Magnetic Particle Inspection, Dye Penetrant Tests, Etc).

The standard method for Non-destructive Testing of fillet joints (sleeve or "belled end" pipe joints) is dye penetration testing.

In the event of any welded joint proving unsatisfactory when the pipeline is subjected to the radiographic, dye penetration or hydraulic tests, the Contractor shall be held

responsible for all costs involved in repairing the joint or cutting it out and welding in a new section of pipe, as may be ordered by the Employer's Representative, and thereafter, for the costs of retesting the final weld and restoring the lining and wrapping, if these have become damaged, all to the satisfaction of the Employer's Representative.

After jointing and testing, the protective lining and wrappings are to be rendered continuous in the manner specified. Holiday detection tests shall be carried out in the field to ensure continuity of lining and wrapping.

The tendered prices for uplifting at the pipe yards, transportation to the work front, handling, laying, jointing and testing of pipes are to include for all the work described above and for the supply of all necessary materials including welding, all necessary plant and labour etc.

## **PSL 7.2 INITIAL TESTS ON WELDED STEEL PIPES**

### **PSL 7.2.1 Dye Penetrant Test**

Add to Sub-Clause:

100% of all fillet welds and other welds shall be dye penetrant tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Representative

### **PSL 7.2.2 Radiographic Examination**

Add to Sub-Clause:

100% of all butt welds shall be radiographically tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Representative.

#### **PSL 7.2.2.1 Radiography personnel**

Radiography and handling of associated equipment shall only be carried out by qualified and approved Radiographers.

The Radiographers shall be in attendance and patrol the perimeter of the Radiographic Area at all times during "bombing".

#### **PSL 7.2.2.2 Marking of radiographic area**

Areas where Radiography is going to take place shall be clearly marked off with recognized tape and warning signs. Generally, this shall be a strip of about 6m wide on each side of the trench and 15m radius elsewhere. The location of the source shall be clearly marked by a red flashing light and the boundary marked by yellow flashing lights.

No person except approved Radiographers shall be allowed to enter the marked off area during radiography exposure.

The Contractor shall ensure that there is easy access for Radiography personnel to minimise their exposure to radiation.

#### **PSL 7.2.2.3 Warning of commencement of radiography**

When radiography exposure is about to commence, adequate warning to persons in the vicinity will be given by flashing lights and audible signals, whereupon all persons within the marked area shall immediately move to a safe position outside the marked area.

Before commencing radiography, the Radiographer shall carry out a thorough inspection to ensure that all personnel have left the area.

**PSL 7.2.2.4 Completion of radiography**

Completion of radiography shall be indicated by the switching off of all flashing lights and an audible signal.

Warning tape and warning signs shall be removed immediately upon completion of radiography in order to allow general work to proceed as planned.

**PSL 7.2.2.5 Storage of radioactive sources**

Radioactive sources may only be brought onto site with the approval of the Employer's Representative. The Radiographers must demonstrate that they have a recognized, safe and secure method of storing such sources.

**PSL 7.2.3 Ultrasonic Examination**

Add to Sub-Clause:

Ultrasonic testing will also be allowed as an alternative to other testing methods. 100% of all butt welds shall be ultrasonically tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Representative.

**PSL 7.3 STANDARD HYDRAULIC PIPE TEST**

The Contractor shall be required to submit to the Employer's Representative a proposed methodology of how he intends to undertake the pressure testing of this pipeline, with attention given as to how the water used for the hydraulic testing of one section can be reused for filling and testing of a following section. The position of the required metered filling points also needs to be agreed with the Authority responsible for the water supply systems of the region.

**PSL 7.3.1 Test pressure and time of test**

Add to the Sub-clause

The field test pressure shall be as per the below table:

Reference Section	Filling Rate (l/s)	Test Head (kPA)	Time of Saturation	Time of Pressure Test
All Pipelines	20 l/s	1600	24 hours	24 hours

Add to the Sub-clause:

Each portion of the pipeline shall be subjected to a field test pressure as tabled above and the pipeline sections may be tested will be at the discretion of the Contractor provided that:

- a) Each section lies within a single test-pressure portion as described above and below in Clause PSL 7.3.1.6 and PSL 7.3.1.7.

The pipeline shall not be tested in sections exceeding a maximum allowable length of 500 m unless otherwise agreed by the Engineer and taking cognisance of any restriction on the length of open trench allowed. The Contractor shall make due allowance in the construction programme and in the tendered rates for the entire testing operation including for the provision of temporary end stops (flanges or bullnoses) and any other costs associated with testing the pipeline in intermediate sections.

**PSL 7.3.1.2**

Delete sub clauses 7.3.1.2

**PSL 7.3.1.3**

Delete sub clauses 7.3.1.3

**PSL 7.3.1.6 Field Testing of Steel Pipelines**

Add new Sub-Clause:

The required test pressure for all STEEL pipework shall be 1600 KPa measured at the lowest point of the pipeline(s).

The pressure tests on the pipeline shall not be carried out against closed valves unless otherwise agreed with the Engineer. All terminal ends on the pipeline sections being tested shall be capped with blank flanges, bull nose ends or "spade" pieces as instructed by the Employer's Representative. Bull noses against which pressure testing is done, shall be welded onto the pipeline with full penetration welds as per the same specification as for a butt welded joint for the specific diameter.

Shorter sections of pipeline may be tested at the discretion of the Contractor. Should the Contractor opt to test the pipeline in shorter sections, he shall so state in his tender and make due allowance for the additional time required in the construction programme and in the rates for temporary capping or flanging and any other ancillary costs incurred. The pipe shall not be tested until the associated structural concrete has cured for 28 days or until such concrete has attained the specified design strength.

In the case of cement mortar lined pipelines, once filled, the pipe shall be left for 24 hours to permit maximum saturation of the cement mortar lining.

The section of pipeline to be tested shall be pressurised to the "TEST PRESSURE" given above and left for 24 hours, during which period, the pressure drop (if any) shall be monitored with the permissible leakage for pipe = 0 litre/m.

Should there be a pressure drop after two hours, the pipe shall be re-pressurised to the "TEST PRESSURE" and the make-up water volume carefully noted.

The make-up volume (if any) shall be compared to the volume of water collected at visible leaking points. Should the make-up volume not be equal to the volume collected at the visible leaking points, the pipe section will have failed the hydraulic test. Should there be a pressure drop with no visible leaks, or should a significant increasing trend in make-up water be apparent, the pipe section will have failed the hydraulic test.

The logistics and strategy for filling and hydraulically testing the pipeline need to be planned in detail and agreed with the Employer's Representative at the early stages of this contract. Arrangements need to be agreed with the Employer (eThekweni Water Services) for making available metered water supply points for filling the sections of the pipeline that need to be tested.

The Contractor shall be required to submit for the approval of the Employer's Representative, a detailed plan of the logistics for transferring the water from a section of the pipeline that has been successfully hydraulically tested, into the next section, so as to minimise the amount of water that might otherwise have to be discharged to waste.

Commissioning of any Section of the pipeline shall only proceed after the pipeline hydraulic testing is successfully completed.

Bull-nose ends may be fabricated from off-cuts of pipe supplied for the relevant section of the pipeline to be tested and will become the property of the Employer once the tests are successfully completed.

The rate for pressure testing is deemed to be inclusive of fabrication and installation of bull-noses, scouring, supplying and install blank flanges, spade pieces etc for the hydraulic test and for removing these items on completion of the successful tests.

On successful completion of the pressure test as per above, the Contractor is to remove all temporary blank flanges, spade pieces, etc. and pressurise the line to maximum working pressure against closed valves. Should any valve not be drop tight at this pressure the Contractor is to advise the Employer's Representative in writing of all defects encountered. The duration of this test shall be 2 hours. The rate for the testing against closed valves is deemed to be inclusive of the pressure testing rate.

All tests shall be carried out in the presence of the Employer's Representative at such times and in such manner as he may direct.

Provision shall therefore be made by the Contractor for the supply of all necessary bull-noses and blank flanges.

At all times when there is water in the pipeline, and particularly during filling, testing and draining of the pipeline, all air valves shall be in operation and their individual isolating valves shall be open.

#### **PSL 7.3.1.7 Testing Procedure for PVC and HDPE pipelines**

Add new Sub-Clause:

The required test pressure for all pipelines shall be 1200 KPa for uPVC and 1250 KPa for HDPE measured at the lowest point of the pipeline(s) with a maximum elevation difference of 20metres and maximum horizontal distance of 500metres between pressure test points.

All costs relating to this work inclusive of scouring, supplying and install blank flanges, spade pieces etc are to be included in the rate for testing. The duration of this test will be minimum of 1 hour.

Prior to testing, sections of the new pipeline shall be installed between one or more reticulation isolating valves complete with all fittings, valves and communication pipelines.

**The hydraulic testing of pipework against closed valves is not allowed.**

The pipe section shall not be filled until associated structural concrete has cured for 28 days and attained design strength and all permanent anchors and fasteners are in place.

The pipe shall be filled at a rate that permits the escape of air and does not induce transient pressure surges.

#### **PSL 7.3.3 Permissible Leakage Rates**

Add new Sub-clause:

In the event that a pipe section fails a test, the Contractor shall carry out all remedial measures necessary to obtain a successful test of each individual section and the entire pipeline, at his/her own expense. Such remedial measures shall in no way compromise the original pipeline specifications.

Add to the end of the sub-clause

The permissible leakage for

- |                                 |              |
|---------------------------------|--------------|
| a) Steel pipelines and fittings | = 0 litre/m. |
| PVC pipelines and fittings      | = 0 litre/m. |
| HDPE pipelines and fittings     | = 0 litre/m. |

#### **PSL 7.3.4 Water For Hydraulic Test And Disinfection (New Sub-Clause)**

Add new Sub-clause:

Water used for one filling of the pipeline for hydraulic testing, one filling for disinfection and one filling after draining the disinfection water, should disinfection be required, will be provided by the Employer to the Contractor, free of charge via a metered Supply. The Contractor is to provide suitably sized meter at the connection point. Additional water supplied by the Employer owing to unsuccessful disinfection and/or hydraulic testing will be charged to the Contractor.

The tendered rates for the construction of the pipeline and the testing thereof are deemed to include for the cost of water for construction purposes and fillings, subsequent to the first fill.

Filling of the pipeline for hydraulic testing shall be carried out under the supervision of the Employer's Representative.

Filling of the pipeline for hydraulic testing shall be carried out in accordance with clause 7.3.1

The Contractor shall, at his own cost, provide a suitable means of conveying water from this connection to the mains to be tested, as well as a connection on the new pipeline in order that it may be filled. This connection shall be capped or removed to the satisfaction of the Employer's Representative upon completion of the hydraulic test. Payment of this shall be allowed for under the rates for the hydraulic testing of the pipeline.

#### **PSL 7.3.5 Initial Filling Of Pipeline (New Sub-Clause)**

Add new Sub-Clause:

The entire process for filling the pipeline at any time during testing or disinfection shall be carried out under the supervision of the Engineer and may also be monitored by the Employer. Under no circumstances will the Contractor be allowed to carry out filling of the pipeline without the supervision of the Engineer, neither shall he/she permit any other persons to carry out such filling without the written permission of the Engineer.

Any damage to the pipeline caused by non-compliance with this clause shall be rectified at the Contractor's expense.

Filling shall commence at the lowest end.

Maximum filling rates might be limited by existing pressure conditions of the system at the connection point. These conditions need to be pre-determined and filling rates available need to be built into the programme for construction of the Works. No claims for delay as a result of low supply pressure will be entertained.

#### **PSL 7.3.6 Connections After Testing (New Sub-Clause)**

Add new Sub-clause:

The connections of the new pipework to the existing pipework shall only be carried out after the pipeline testing has been completed and accepted by the Engineer. For this reason, testing must be carried out against a blank flange, spade piece or bullnose end cap at these locations.

#### **PSL 7.3.7 Remedial Measures (New Sub-Clause)**

Add new Sub-clause:

In the event that a pipe section fails a test, the Contractor shall carry out all remedial measures necessary to obtain a successful test of each individual section and the entire pipeline, at his/her own expense. Such remedial measures shall in no way compromise the original pipeline specifications.

#### **PSL 7.3.8 Draining Of The Pipeline (New Sub-Clause)**

Add new Sub-clause:

The pipeline may have to be drained to carry out remedial measures. The pipeline shall be drained via the scour valves in a manner that does not cause erosion of the streambeds or negatively impact on the environment in any way. All such drainage of the pipeline shall be carried out under the supervision of the Engineer.

All water to be drained after disinfecting the pipeline shall be discharged in a temporary portable holding tank to dilute the chlorinated water, if required. The tendered rates for pipeline testing and disinfecting is deemed inclusive of dichlorination agents and holding tank.

For pipelines of diameters where it is practically not possible to gain human access for inspection of the internal cleanliness of the pipeline, the Contractor shall ensure that any open ends are firmly closed

#### **PSL 7.5 COMMISSIONING (NEW SUB-CLAUSE)**

Add new Sub-clause:

The pipeline will be considered to have been commissioned and practically complete once all the associated structures are sufficiently complete to carry out their structural, hydraulic and mechanical function and the hydraulic test and disinfection of the entire pipeline has been successfully completed.

The scheduling of commissioning requirements for the pipelines need to conform with the requirements as stated under section **PS 4.4** .

#### **PSL 7.6 WATER TIGHTNESS TEST FOR CHAMBERS (NEW SUB-CLAUSE)**

Add new Sub-clause:

On completion of each concrete valve chamber, and prior to completion of the backfilling around the chamber, a water tightness test shall be undertaken by the Contractor. This shall be carried out by excavating a trench approximately 0,5 m deep around the periphery of the chamber and continuously (for at least 4 hours) maintaining it full of water. Should there be any noticeable leaks into the chamber, the Contractor shall carry out at his/her own expense whatever measures are necessary to waterproof the chamber to the Engineer's satisfaction.

**PSL 8 MEASUREMENT AND PAYMENT****PSL 8.2 SCHEDULED ITEMS****PSL 8.2.1 Supply, Lay And Bed Pipes Complete with Couplings**

Delete the sub-clause and substitute:

Supply, transport, lay, and bed pipes complete with couplings.

Pipelines will be measured by length over all lengths as laid. No deduction will be made for specials and valves. Separate items will be scheduled for each diameter, type and class of pipe laid.

The rates tendered shall cover the cost of supplying, manufacturing, transportation of pipe to the work front, offloading and checking of the pipe for defects before placing, forming joint ("fox") holes in all excavated materials, setting out, installation, handling, laying and bedding.

Where joints of lengths of pipe (excluding joints to pipe specials) are concerned, separate payment items have been created for.

Notwithstanding the above, the rate for "supply, lay and bed pipes" excludes the cost associated with the field pressure testing and disinfection of the pipeline. Separate items have been included in the Bill of Quantities for the cost associated with pressure testing and disinfection of the pipeline.

The Contractor shall ensure that residents have access to their properties and that access to relevant road users is maintained at all times, that traffic control is exercised as per the relevant specification and that the appropriate construction technique is utilized for the specific site constrictions.

The Contractor shall familiarize himself with the pipeline route and the terrain over which the pipeline is to be constructed and the tendered rates under this item shall be deemed to include for all eventualities, covering steep grades, restricted access, confined spaces, high traffic volumes, working in road reserves, or whichever condition might present itself during construction to lay and bed the pipe.

Unit: m or E/O the linear metre rate, or by number as scheduled in the Bill of Quantities.

**PSL 8.2.1.1 Extra Over for Laying of Pipe under Powerlines and Servitudes (New Sub-Clause)**

Add new Sub-Clause:

The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his rate for every eventuality of working in the vicinity of existing services; overhead powerlines; pylon bases and pipelines including all relevant Health and Safety procedures and precautionary measures pertaining to working in the servitude or under or in close proximity of overhead powerlines shall be implemented, working in areas where pipe laying could be restricted to one length at a time.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the transportation of the pipe, the excavation and removal of spoil, the importation of bedding material, the laying of the pipe and all other associated activities that are impeded as a result of difficult access, and all other aspects that require consideration in order to lay and bed the pipe.

Unit: m

## **PSL 8.2.2      Extra Over 8.2.1 For The Supplying, Laying And Bedding Of In Line Specials**

Add to Sub-Clause:

The rates shall cover the cost of supplying pipes and for fabricating and radiographic and/or hydraulic testing of bends, fittings specials, and supplying and installing flanges, couplings, valves and other appurtenances as scheduled, making good the coatings and linings, handling, inspecting, marking bends, fittings and specials with item numbers, transporting, holiday detection testing for coatings of steel pipes, forming joint ("fox") holes in all materials, off-loading, installing, bedding, laying, welding, jointing, cutting, all testing and disinfecting and where relevant all welding and the completion of the internal and external corrosion protection (make good) and jointing materials (e.g. nuts, bolts, washers, gaskets, welding rods etc.) and field wrapping to specifications where required for:

a) In-Line Tees

In-Line Reducers

In-Line Elbows and Bends

In-Line Flanges

Bull Noses

Segmented Bends

Slip on flanges

Other In-Line Specials such as spacers, spool pieces, stubs for air valves etc. as specified.

The rate will also be inclusive of gaskets, fasteners, washers, bolts, nuts, painting and field wrapping of joints.

All fabricated pipe specials to be marked with item numbers which correspond to test certificates. All items to be supplied with quality control documentation. Shop drawings of bends, fittings and specials shall be submitted to the Engineer for approval prior to manufacture.

## **PSL 8.2.3      Extra Over 8.2.1 For Supplying, Fixing And Bedding Of Valves**

Add to the end of the sub-clause:

Valves shall be supplied against the required specification.

The prices tendered for supplying the pressure sustaining/pressure reducing valve and level control/flow control/pressure reducing valve assemblies shall cover all expenditure and everything necessary to be done by the manufacturer and supplier in order to comply with the requirements of the specifications, including attendance on site by a representative of the supplier for checking, commissioning, testing and demonstrating all in accordance with the specification and upholding insofar as supply of replacements for defective parts is concerned, all in accordance with the terms of the Contract.

## **PSL 8.2.5      Supply And Installation Of Other Specials**

Valves shall be supplied against the required specification.

The rate shall cover the cost of fabrication, supply, installation, uplifting and transportation, off-loading, testing of all valves, cutting and welding, gaskets, jointing (e.g. nuts, bolts, washers etc), fasteners, NDT inspections, corrosion protective wrappings etc. and for internal and external coating and lining to project specifications.

The rate for the blank flanges must be inclusive of the specified gaskets, fasteners, washers, lining and painting. The rates for any test flanges must be inclusive of the blank flange, flanged connection, isolation valve, gasket and bolts, nuts and washers required to assemble test flanges and to attach test flanges to a flange.

All fabricated pipe specials to be marked with item numbers which correspondent to test certificates. All items to be supplied with quality control documentation.

#### **PSL 8.2.11 Anchor Blocks/Thrust Blocks And Pedestals**

Add the following:

The tendered rates shall cover the cost of formwork, concrete, reinforcement (if any), and screeding to top surfaces.

The tendered rate shall also include the wrapping of uPVC pipes and fittings with Densopol 80 or a similar approved material where the pipes and fittings come into contact with concrete.

Unit: m<sup>3</sup>

#### **PSL 8.2.15 Specials - Wrapping In Corrosive Soils**

Delete the heading and substitute:

Corrosion Protection

Delete the Sub-Clause and substitute the following:

The costs of making good the internal linings and external coatings on all butt welded and fillet welded joints on the pipeline are to be included in the tendered rates.

Add new items:

External corrosion protection to flanges, adaptor joints, valves: Separate items will be scheduled for each item by pipe nominal diameter. In the case of valves, the rate shall include for protection of the whole of the valve body, all flanges integral to the valve, the connecting flanges to the valve (i.e. including the two flanges of the pipework connected to either side of the valve) and the packing of mastic (without tape or sheathing) over the gland adjusting bolts and nuts.

Unit : No

#### **PSL 8.2.16 Pipeline Marker Posts**

Add new Sub-Clause:

Payment shall be per cost installed and shall include for the uplifting and transporting to site from the Municipal depot, handling, excavation, installation, backfilling and painting.

Unit: No

#### **PSL 8.2.17 Cutting Into Existing Steel Pipeline**

Add new Sub-Clause:

The rate shall cover the cost of the cutting of the existing steel pipe, end preparation and making good of lining and coating.

The rate shall also cover preventing deformation of the ovality of the existing pipe once cut. All temporary or permanent supports are deemed to be inclusive in the rate for cutting of existing steel pipe.

The rate shall allow for everything necessary to carry out the removal of existing pipes and installation of new connections to following existing pipes. Rates are to include for: carefully exposing the existing pipelines, making arrangements with eThekweni's staff to temporarily shut of water on the existing pipelines to facilitate making the connection, cleaning pipelines, preparing the pipes for cutting, cutting pipes, dealing with all water (including that from leakages), preparing the pipe end for pipe jointing/welding and connecting the new pipework, making good internal lining and external coatings, recommissioning the pipeline and including all temporary supports, bedding and backfilling.

Loading and transporting removed sections to eThekweni water depot at Electron road, Springfield is covered elsewhere. The whole installation is to be completed within 8 hours. (All new pipes, valves and fittings required are measured elsewhere).

Unit: No

### **PSL 8.2.18 Cutting And Connecting To Existing AC Pipeline**

Add new Sub-Clause:

The rate shall cover the cost of the cutting of the existing pipe and end preparation in accordance to Construction Regulations, 2014, Asbestos Regulations, 2001 and Environmental Management Plan, PEM 5.11 Hazardous Waste bound in the Document.

Allow for everything necessary to carry out the removal of existing pipes and installation of new connections to following existing pipes: Rates are to include for carefully exposing the existing pipelines, making arrangements with eThekweni's staff to temporarily shut of water on the existing pipelines to facilitate making the connection, cleaning pipelines, preparing the pipes for cutting, cutting pipes, dealing with all water (including that from leakages), preparing the pipe end for pipe jointing/welding and connecting the new pipework, making good internal lining and external coatings, recommissioning the pipeline and including all temporary supports, bedding and backfilling.

The transportation and disposal of all removed AC pipe must comply with environmental safe disposal regulations and be delivered to a hazardous materials spoil site for proper disposal. The whole installation is to be completed within 8 hours. (All new pipes, valves and fittings required are measured elsewhere).

Unit: No

### **PSL 8.2.19 Cutting Into Existing PVC Pipeline**

Add new Sub-Clause:

The rate shall cover the cost of the cutting of the existing and end preparation.

The rate shall allow for everything necessary to carry out the removal of existing pipes and installation of new connections to following existing pipes. Rates are to include for: carefully exposing the existing pipelines, making arrangements with eThekweni's staff to temporarily shut of water on the existing pipelines to facilitate making the connection, cleaning pipelines, preparing the pipes for cutting, cutting pipes, dealing with all water (including that from leakages), preparing the pipe end for pipe jointing/welding and connecting the new pipework, making good internal lining and external coatings, recommissioning the pipeline and including all temporary supports, bedding and backfilling.

Loading and transporting removed sections to eThekweni water depot at Electron road, Springfield is covered elsewhere. The whole installation is to be completed within 8 hours. (All new pipes, valves and fittings required are measured elsewhere).

Unit: No

#### **PSL 8.2.20 Meter Protection Sleeve**

The tendered rates shall cover the cost of all works required for the supply and installation of meter protection sleeve pipe as depicted on the drawings for Type 1 and Type 2.

Unit: No

#### **PSL 8.2.21 Hydraulic Testing (New Sub-Clause)**

Add new Sub-Clause:

The rates shall cover all the cost of all the required materials, equipment, connections, personnel and procedures for filling, testing and draining of the pipeline where required, or sections of the pipeline during hydrostatic testing. The rates shall cover the cost of the water required for hydrostatic testing.

#### **PSL 8.2.22 Preparation and welding of bell ended joints in Pipeline (New Sub-Clause)**

Add new Sub-Clause:

The Contractor shall include in his rate for welding of straight joints (butt welding for plain ended pipes and fillet welding for bell ended pipes) in pipelines, the supply of materials, labour, plant, equipment and supervision required at each joint.

The Contractor shall include in his rate for welding of straight joints in pipeline, the supply of all materials, labour, plant, equipment, supervision, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on-site external tape wrap and internal lining repair in terms of the specification, required at each joint.

Unit: No

#### **PSL 8.2.23 Preparation and welding of single mitred joint in pipeline**

Add new Sub-Clause:

The Contractor shall include in his rate for preparation of single mitres in order to effect a mitred joint in terms of the construction drawings, the welding of the single mitred joint in pipeline, the supply of materials, labour, plant, equipment, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on site external tape wrap and internal lining repair in terms of the specification and supervision required at each joint.

Bell ended joints with directional change shall be tendered for under this item

Preparation and welding of single mitred joints in pipeline, refer to PSL 3.4.4.2.

Unit: No.

#### **PSL 8.2.24 Preparation and Welding Collar Welded Joints in Pipeline**

Add new Sub-Clause:

The Contractor shall include in his rate for welding of collar welded joints in pipelines, the supply of all materials, labour, plant, equipment, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on-site external tape wrap and internal lining repair in terms of the specification and supervision required at each joint.

The tendered rate shall include for both fillet welds, one on each side of the collar. A collar welded joint shall be counted as one joint and not two as a result of the 2 fillet welds required to complete the joint.

The collars/ bands shall have a minimum width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, and a minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes

Welding of collar welded joints in pipeline (Diameter Nominal specified) (Provisional Quantity)

Unit: No

#### **PSL 8.2.25 Preparation by means of cutting**

The rates tendered shall cover the cost of supply and installation of all materials, equipment, procedures and personnel to carry out cutting of steel pipe where directed by the engineer, for the installation of same, under conditions where dense services requires the laying of pipe in shorter than standard lengths. the rate for cutting shall include for internal lining and coating repair (Provisional quantity).

#### **PSL 8.2.26 Cathodic Protection (If Applicable)**

This work is to be done by a Nominated Sub-Contractor. The Civil Contractor is to liaise & cooperate with the CP specialist to ensure that the activities of the specialist proceed in the best possible manner.

Precise details of the location of elements of the Cathodic Protection System will be confirmed by the Engineer's Instructions on site, but the following points are noted:

- a) Continuity bonding is required around all in-line valves.
- b) Monitoring test points are to be installed in the line valve chambers, where shown.

**Insulating flanges are required at all inlet and outlet pipe positions.**

Unit: No

#### **PSL 8.2.27 Laying of Pipe Through Drilled Sleeves (New Sub-Clause)**

Add new Sub-Clause:

The rates tendered shall cover the cost of supply, setting out, installation, handling, cutting to closures and preparing ends for welding of joints, laying true to line and level on prepared trench bed., the careful feeding of pipe into and through the horizontally direction drilled sleeve, any cutting, welding and joint repair that is required to feed the pipe into and through the jacked sleeve.

Unit: m

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**PSL 8.2.28    On site external tape wrapping and internal lining repair of welded joints in pipeline (New sub-clause)**

Add new Sub-Clause:

The Contractor shall include in his rate for the supply of all materials, labour, plant, equipment, supervision and QQA/QC for on site external tape wrap and internal lining repair in terms of the specification, of straight butt welded joints and butt welded single mitred joints as well as straight and single mitred joints in bell ended pipe or pipe jointed by welded collars.

On site external tape wrapping and internal lining repair of welded joints in pipeline (specified by nominal diameter)

Unit: No

**PSLB BEDDING (PIPES) (SABS 1200 LB – 1983)****PSLB 2.3 DEFINITIONS**

Main fill:

Delete "150 mm" in second line and substitute "300 mm".

**PSLB 3 MATERIALS****PSLB 3.1 SELECTED GRANULAR MATERIAL**

Delete the Sub-clause and add the following:

All the material to be used for the bedding material (that is for the cradle and the blanket material) surrounding the pipe, shall fall within the following requirements.

**GRADING ANALYSIS RANGE**

SIEVE SIZE (mm)	PERCENTAGE PASSING
9,5	100
6,7	98 to 100
4,76	85 to 100
2,36	55 to 95
1,18	30 to 75
0,60	20 to 50
0,425	16 to 38
0,30	13 to 27
0,15	5 to 18
0,075	0 to 12

The material shall be free of organic matter and shall have a compactibility factor of not more than 0.4. The material should be classified as silty to fine sand having a stiffness ratio of not less than 5,0 MPa. Furthermore, the origin of the materials should, preferably, be river transported since it is preferable that the larger grains (3,0 to 6,7 mm in size) be rounded and not sharp and angular.

The Contractor shall be required to supply samples of the sand to be used as bedding material, to the Engineer for approval, 5 days before use. Only after the Contractor has received written approval from the Engineer, may he proceed with placing sand as selected granular material.

The Contractor shall carry out his own quality control testing of the granular bedding materials to ensure that it meets the specification.

The Contractor shall be required to supply samples of the sand to be used as bedding material, to the Employer's Representative for approval. Only after the Contractor has received written approval from the Employer's Representative, may he proceed with placing sand as selected granular material.

The Contractor will carry out his own quality control testing of the bedding material to ensure that it meets specification. At least one grading analysis should be carried out for every 250m of pipeline installed. The results of these tests must be given to the Employer's Representative within 24 hours of completion of the test.

If any material used in the bedding of the new pipes is found to be outside the specification, the Contractor will remove and replace this material with approved sand at his own cost.

### PSLB 3.2 SELECTED FILL MATERIAL

Delete and replace with:

Imported selected fill material shall have a PI not exceeding 6 and shall be free of vegetation, lumps and angular stones. Maximum particle size shall be 19mm with at least 60% passing the 6.75mm sieve.

The material shall be granular and non-flaky and shall contain no organic matter. It shall have a PH greater than 5.5 and shall not cake or form lumps when drying out. The material obtained from the trench excavations might generally be suitable for use as selected fill material which is placed above the Selected Granular Material bedding to the pipe.

Several conditions for the placement of the selected fill material have been identified and will require separate treatment in the field as and when these arise:

#### **Pipeline to be constructed beneath existing road.**

In this case the selected fill material shall be taken to the underside of the proposed new layerworks construction where the new road will match the existing road layers or will be constructed to a new design specification. In this case the selected fill material will be placed from the top of the pipe bedding to the bottom of road subgrade level and compacted to minimum 97% Mod AASHTO density. Thereafter the structural road layers will be constructed. This procedure is necessary to limit settlement beneath roads.

#### **Pipeline to be constructed in open field, pipeline/road reserves or rural areas under no traffic conditions.**

In this case the settlement of the trench outline is not a critical issue and construction of the pipe will proceed with normal **backfill material (PSDB 3.5)** placed over the selected granular bedding material as specified elsewhere in this document. The normal backfill over the selected granular material will be taken to the top of the trench at ground surface where it will be built proud by up to 100 mm of the surrounding ground surface. Placement of the normal backfill material to ground surface level will be carried out in layers maximum 300mm loose thickness. Compaction will be minimum 95% Mod AASHTO,

#### **Pipeline to be constructed in trench excavated entirely in bedrock.**

In this case the selected fill placed over the bedding to the pipe will be stabilised with minimum 5 % cement by mass and compacted in layers of loose thickness 200mm to minimum 97% Mod AASHTO dry density. This stabilised layer will be taken to the top of the trench at ground surface where it will be built proud by up to 200 mm of the surrounding ground surface. This procedure is required to prevent preferential erosion paths or gulleys forming on the trench line as would be the case with normal (unstabilised) backfill within the trench with shallow bedrock sides.

#### **Pipeline to be constructed on steep slopes where the natural gradient exceeds 1V:3H.**

This case is similar to (iii) above where it is necessary to limit or prevent preferential erosion over the trench outline. The selected fill placed over the bedding to the pipe will be stabilised with minimum 5 % cement by mass and compacted in layers of loose thickness maximum 200mm to minimum 97% Mod AASHTO dry density. This stabilised layer will be taken to within 200mm of the top of the trench at ground surface. This upper 200mm will be placed with organic rich topsoil from stockpile for re-vegetation.

Depending on the Engineer's assessment either the full length of trench along the steep section or only limited sections not less than 3 metres at intervals of 15 metres along the trench line may be treated in this way. Depending on the assessment of the erodibility potential of the insitu and backfill soils by the Engineer sections of pipeline running down slope in areas flatter than 1V:3H may also require this treatment.

### **PSLB 3.3 BEDDING**

Add the following to Sub-Clause:

Steel pipelines shall be bedded as per Drawing LB-3 (d) of SABS 1200LB where the cradle material and the blanket material up to 300mm above the crown of the pipe, consists of selected granular material.

Portions of the pipeline may warrant the need for soilcrete and will be prepared, placed and compacted as per the relevant drawings.

Concrete stormwater pipes are to be regarded as rigid and shall have Class C bedding as per drawing LB-3 of SABS 1200 LB. Cable ducts shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-2 of SABS 1200LB.

All subsoil pipes shall be bedded in accordance with the typical details shown on the relevant drawings.

Bedding materials (for cradle and blanket material), such as Umgeni River sand or similar approved non-cohesive materials shall be compacted to 100% Mod. A.A.S.H.T.O. either by full saturation or mechanical means or a combination of both, approved by the Employer's Representative.

The Contractor will be required to supply samples to the Employer's Representative of the bedding material to be used in the cradle as well as for blanket material, inclusive of the analysis of the characteristics of the material. Only after the Contractor has received written approval from the Employer's Representative, may he proceed with placing of selected granular material bedding.

Should the Contractor change the source of the bedding material, samples of the proposed material shall be supplied to the Employer's Representative, inclusive of the analysis of the characteristics of the material. Only after the Contractor has received written approval from the Employer's Representative, may he proceed with placing of the new selected granular bedding material.

The costs for the grading analysis tests shall be included in the tendered rates for the supply, placement and compaction of the selected granular material.

### **PSLB 3.4 SELECTION**

Add to Sub-Clause:

Notwithstanding the requirements of sub-clause 3.7 of SABS 1200 DB and sub-clause 3.4.1 of SABS 1200 LB regarding the use of selective methods of excavating, the Contractor shall use selective methods of excavating and shall provide and use plant that will enable him to avoid burying or contaminating material that is suitable and is required for bedding.

#### **PSLB 3.4.1 Suitable Material Available From Trench**

Replace the words "(but is not required)" in the fifth line with the words "at his own cost".

##### **PSLB 3.4.1.1 Selected Excavation (New Sub-Clause)**

Add new Sub-Clause:

The Contractor is required to excavate selectively for bedding materials and selected fill materials.

### **PSLB 3.4.3 Crushed Stone Bedding (New Sub-Clause)**

Add new sub clause:

Where the conditions on the trench bottom are too wet to use selected granular material as this would not be practical, 19mm single sized crushed stone material from commercial sources will be used to form a pioneer layer. Depending on conditions to be assessed by the Engineer, dump rock might be instructed as a base for the 19mm stone pioneer layer. This will involve the use of geotextile material as instructed. The use of stone as a pioneer layer is only applicable after approval of the Engineer.

## **PSLB 5 CONSTRUCTION**

### **PLSB 5.1 GENERAL**

Add to sub clause:

The determination of pipe as “flexible” or “rigid” will be according to the procedure given in section 4.5 of Part 1 of SANS 0102.

#### **PSLB 5.1.2 Details Of Bedding**

Delete and replace with:

The cradle thicknesses shall be as follows:

For DN600 and smaller

Cradle thickness to be 100mm

For greater than DN600

Cradle thickness to be 300mm

The blanket material thickness above the crown of the medium pressure pipe shall be 300mm for all diameters of pipe.

Steel pipelines treated as slender or flexible pipe shall be bedded as per Drawing LB-3 (d) of SABS 1200LB.

PVC and HDPE pipes shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-3-(d) of SABS 1200LB.

Cable ducts shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-2 of SABS 1200LB.

#### **PSLB 5.1.2.1 Stone drainage layer beneath bedding (New sub-clause)**

Add new Sub-Clause:

Where indicated on the drawings, or as otherwise indicated by the Engineer, a 200mm thick layer of 19mm stone shall be placed beneath the bedding layer to act as a drainage channel for excessive ground water. This layer shall be wrapped in an approved geotextile and provided with outlet pipes where indicated on the drawings or as directed by the Engineer, so as to drain away from the pipeline any excess water that accumulated in the trench. The Contractor shall ensure that all the stipulations for handling of ground water in

any sub-surface drain are adhered to. Should conditions on site be such that the design does not cater for the specific condition encountered, he shall immediately resort to seeking the advice from the Engineer. The Contractor must be aware that the handling of sub-surface water and the drainage there of is an environmentally sensitive issue.

The Contractor's attention is drawn to the fact that the installation of sub-soil drains will be as per the direction of the Engineer and will only be required after the Engineer has done an inspection in order to assess the suitability of a specific type of sub-soil drain and has approved of the same.

### **PSLB 5.1.3 Placing Of Bedding**

Add to Sub-Clause:

No loose rocks or stones shall be permitted to rest against the pipe barrel during the placement and compaction of the bedding cradle or blanket. In addition to the provisions of clause 5.1.3.3, hand equipment shall be used to compact the bedding material under the haunches and immediately next to the pipe. No vibratory mechanical equipment shall be allowed to make contact with any part of the pipe or be used on the bedding blanket directly above the pipe.

End tipping of bedding directly into trench will not be allowed.

### **PSLB 5.1.4 Compaction**

Delete and replace with:

For continuously welded steel pipelines of diameter DN600 and above, the bedding is to be compacted to 100% MOD AASHTO. For flexible pipes the drawing LB – 3(d) in SABS 1200 LB is applicable.

Compaction for smaller diameter steel pipelines and pipelines of other materials, the compaction density shall be in terms of the requirements on the drawings. Non flexible pipes shall consist of a class C bedding whilst flexible pipes shall be deemed to have been priced for bedding placement in terms of drawing LB – 3(d) in SABS 1200 LB.

The Contractor shall take steps to ensure that flexible pipes do not deform excessively in cross-section during and after construction and backfilling operations. The maximum deflection which will be acceptable at any stage during or after construction is 5% of the pipe diameter horizontally or vertically. The Contractor will be required to provide the necessary apparatus and to monitor deflection during construction.

Pipe deformations will only be maintained within the specified tolerances by correct backfilling practice. No heavy compaction equipment will be permitted for compaction of any pipe bedding, only pneumatic or hand rammers being acceptable. To this end, and to achieve the required compaction specified it is required that the bedding material be brought up evenly on either side of the pipe. The use of complete saturation of the material as a method of achieving the specified compaction may, subject to the Engineer's approval, be used. However, in this regard, contractors are advised that the presence of excessive quantities of water in the pipe trench could lead to flotation of the pipe. It is the duty of the Contractor to ensure that pipelines do not float in the bedding material during construction.

Prior to the commencement of pipe laying the Contractor shall submit, to the Engineer for approval, the placing and compacting methods which he proposes to implement in order to ensure compliance with the specification.

Blanket material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 200mm measured loose and compacted to the required density utilising the required compaction method. Movement and deflection of the pipe shall be avoided.

Particular attention shall be paid to compaction of material in the pipe haunch area. Compaction shall be achieved by hand punning horizontally and obliquely with a suitably sized and shaped hand tool. The Contractor shall take the necessary precautions not to inflict damage to the pipeline coating when compacting the cradle and the blanket material.

All costs for providing the water required for the saturation of the material, temporary retaining measures to prevent backfill material from “ flowing “ away from point of application, and or retaining measures to terminate a specific backfill section for whatever reason, shall be deemed to be included in the tendered rates for supply, place and compact of bedding material.

Some materials such as decomposed granite and dolerite may have inherent radioactive mineralogy which may affect the accuracy of the compaction monitoring results when the nuclear density meter method is used to measure compactions. Where such mineralogy results in both erratic and inconsistent measurements it may be necessary as determined by the Engineer, to resort to the standard or reference method of soil density measurement which is the sand replacement test.

The Contractor shall carry out his own quality control testing of the proposed bedding material to ensure that it meets this specification.

At least one grading analysis should be carried out for every 250 metres, per layer, of bedding placed. The results of these tests shall be forwarded to the Engineer within 24 hours of completion of the test. Should the material not comply with the specification, the Contractor shall remove and replace material not complying with the specification, with approved material, at his own cost.

Should the Contractor change the source of the bedding material, or should the bedding material come from a new location within a quarry, samples of the proposed material shall be supplied to the Engineer, inclusive of the analysis of the characteristics of the material. Only after the Contractor has received written approval from the Engineer, may he proceed with placing of the new selected granular bedding material.

The costs for the grading analysis tests shall be included in the tendered rates for the supply, placement and compaction of the selected granular material.

No extra payment will be made for forming or filling joint holes (pockets).

#### **PSLB 5.1.5 Testing (New Sub-Clause)**

Add new sub clause:

Flexible and flanged joints shall be left exposed with a minimum of 300 mm clearance around the bottom of the pipe during hydraulic pressure testing of the pipe to facilitate inspection.

#### **PSLB 5.2 PLACING AND COMPACTING OF RIGID PIPES**

##### **PSLB 5.2.2 Class ‘C’ Bedding**

Delete the third, fourth and portion of the fifth lines of the Sub-Clause and substitute the following:

“The pipes shall be bedded on a layer of compacted granular bedding material on which a 25mm thick layer of uncompacted granular bedding material has been placed and spread. Loose granular bedding material lying next to the pipe shall be placed into the haunch area and compacted with suitable hand tools, and additional selected granular material shall be added and compacted in layers until levels for the bedding cradle as shown on Drawing LB - 1 (c) are reached. The remainder of the bedding i.e. the selected fill blanket, shall be

placed in layers up the sides of the pipe, each layer being compacted until levels are reached as shown on Drawing LB-1 (c)."

## **PSLB 7      TESTING**

Compaction testing shall be executed at least every 15m to 25m for every layer but the Contractor needs to establish a test regime more stringent than the stated should he require this for quality assurance. This shall include bedding and selected or common fill layers above the bedding layers.

## **PSLB 8      MEASUREMENT AND PAYMENT**

### **PSLB 8.1      PRINCIPLES**

All rates provided for bedding placement and compaction shall be deemed inclusive of all machinery and plant required to work under all width conditions. For this purpose, rates for trench compaction shall include for narrow width compaction with suitable compaction equipment and machinery. On the opposite end of the scale, compaction rates for, for example, road layer works, shall be fully inclusive of the typical plant and equipment used for road layer works.

#### **PSLB 8.1.1      Supply Of Bedding Materials Separately**

Add to sub clause:

The measurement of bedding shall be the total through length along the centre of the pipeline measured horizontally with deductions made for the line valve chamber.

#### **PSLB 8.1.3      Volume Of Bedding Materials**

Add to Sub-Clause:

The volume of bedding material shall be measured nett i.e. the volume of the pipe and inline valve chambers is to be deducted.

The tendered rate for bedding shall not be re-negotiated as a result of a change in supplier.

#### **PSLB 8.1.4      Separate Items For Cradle And Blanket**

Delete Sub-Clause and replace with:

Separate items are scheduled for material for the bedding cradle and for the bedding blanket material, to provide for the probability that the excavated material from the trench is more likely to comply with the requirements for the latter than the former.

The tendered rates for the supply of cradle and blanket material shall include for the supply of same at all grades and no additional financial compensation for the supply of bedding at steep grades will be considered.

#### **PSLB 8.1.5      Disposal Of Displaced Material**

Delete the first sentence and replace with:

Material displaced by the pipeline and by importation of material from sources other than trench excavation, shall be disposed of offsite to an approved spoil disposal site. No additional payment for such disposal will be entertained.

No overhaul shall be paid.

**PSLB 8.1.6 Free Haul**

Delete the Sub-Clause and substitute the following:

All haul will be regarded as free haul. No overhaul will be paid for under this Contract.

**PSLB 8.2 SCHEDULED ITEMS****PSLB 8.2.1 Provision Of Bedding From Trench Excavation**

Delete the Sub-Clause and substitute the following:

Without the need for screening:

- |     |                            |                       |
|-----|----------------------------|-----------------------|
| (a) | Selected granular material | Unit : m <sup>3</sup> |
| (b) | Selected fill material     | Unit : m <sup>3</sup> |

The rates shall cover the cost of acquiring along the trench excavation as may be selected by the Engineer, 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, of making good any backfill deficiency from points where backfill has been acquired, and of disposing of displaced material.

The rate for the supply and laying of pipelines covers the cost of handling the bedding material from alongside the trench, placing it under the pipeline, filling of joint holes and completing the bedding around and over the pipeline, as well as placing of selected fill material.

**PSLB 8.2.1.1 Extra over item PSLB 8.2.1 for screening (New sub-clause)**

Add new Sub-Clause:

The unit measurement shall be cubic metre (m<sup>3</sup>).

The rates shall cover the cost of screening or otherwise treating excavated material, at any point along the trench excavation as may be selected by the Employer's Representative, in order to produce bedding that complies with the relevant specification, delivering it to points alongside the trench, spaced to suit the Contractor's methods of working, of making good any backfill deficiency there may be from points where screened backfill material has been acquired.

The rate provided against the volumetric unit shall be applicable to the volume of material produced in terms of the required specification and not the volume of material screened in the first instance.

**PSLB 8.2.2 Supply If Bedding By Importation**

Delete the sub-clause and substitute the following:

Including for screening and/or other treatment:

- |    |                            |                       |
|----|----------------------------|-----------------------|
| a) | Selected granular material | Unit : m <sup>3</sup> |
| b) | Selected fill material     | Unit : m <sup>3</sup> |

The rates shall cover the cost of acquiring, loading, transporting, offloading, screening or otherwise treating excavated material in order to produce bedding that complies with the relevant specification, delivering it to points alongside the trench spaced to suit the Contractor's methods of working and of disposing of displaced material.

**NOTE:** The rate for the supply and laying of pipelines covers the cost of handling the bedding material from alongside the trench, placing it under the pipeline, forming joint holes and completing the bedding around and over the pipeline.

### PSLB 8.2.2.3 From commercial sources

Delete the Sub-Clause and substitute the following:

Material measured under this item to be sourced from commercial sources by Contractor.

- |    |                            |                      |
|----|----------------------------|----------------------|
| a) | Selected granular material | Unit: m <sup>3</sup> |
| b) | Selected fill material     | Unit: m <sup>3</sup> |

The rates shall cover the cost of acquiring, loading, transporting, and, offloading in order to produce bedding that complies with the relevant specification, delivering it to points alongside the trench spaced to suit the Contractor's methods of working and of disposing of displaced material. No overhaul shall apply.

### PSLB 8.2.4 Encasing Of Pipes In Concrete

Add to Sub-Clause:

The rate for concrete encasing shall include for the supply, installation and stripping of all formwork.

Where river crossings are applicable and the drawings specify concrete encasement with stone pitching, the rate for concrete encasing shall include for such stone pitching stone which is retrieved from pipe trench excavations in the vicinity of the river crossing or retrieved from the immediate area.

Expansion/contraction joints to be as instructed by the Engineer.

### PSLB 8.2.6 Drainage Layer (New Sub-Clause)

- |    |   |                       |
|----|---|-----------------------|
| a) | Supply and place stone filling beneath pipe | Unit : m <sup>3</sup> |
|----|---|-----------------------|

The rate shall be for a 150mm deep crushed stone layer as ground water drainage measured according to a width equal to the base widths. The excavation for these drains will be measured in cubic metres at the tendered rate applying to unsuitable excavation below the bottom of the trench (SABS 1200 DB 8.3.2 c).

- |    |  |  |
|----|--|--|
| b) | Supply and installation of geofabric filter material |  |
|----|--|--|

(BIDIM Grade A4 or similar) around stone	Unit : m <sup>2</sup>
--	-----------------------

The rate shall be per square metre of geofabric to enclose the stone material, measured net according to a width equal to the base widths and depths ordered.

**PSLC CABLE DUCTS (SABS 1200 LC)****PSLC 3 MATERIALS****PSLC 3.1 DUCTS**

Add the following to Sub-Clause:

Ducts for cables shall comply with SANS 61386-24. The pipe diameters shall be as scheduled in the Bill of Quantities and drawings. Normal duct class with spigot and socket rubber ring joints. Both ends of each duct must be sealed with an end cap. The pipe cable ducts shall be

SANS 791 Class 34 (Heavy Duty) for cast into concrete structures and/ or buried or

HDPE "Kabelflex" or similar approved for buried installations.

Ducts for relocated or new telephone cables shall be 110mm dia. uPVC coreflow pipes as provided by Telkom.

**PSLC 3.4 CABLE DUCT MARKERS**

Add the following to Sub-Clause:

The end of each cable duct installed shall be marked with a cable duct marker as indicated on the relevant drawings

Further to the above "record" information giving exact co-ordinates and levels at each end of a duct and the size of duct laid at each road crossing shall be supplied to the Engineer in writing or electronically in the format specified within one week of installation. The above shall be included in the rates for cable duct markers."

**PSLC 5 CONSTRUCTION****PSLC 5.1 EXCAVATION OF TRENCHES**

Add to Sub-Clause:

All ducts shall be laid with a minimum of 800mm cover under roads and shall extend to within 0.1 m of the position provided on the drawings or at least 500mm beyond the kerb line. Where paved footpaths are present or are to be provided in the future the ducts shall extend at least 500mm beyond the paved footpath.

All excavation quantities for cable ducts are measured under PSDB.

**PSLC 5.3 DUCT LAYING****PSLC 5.3.3 Draw Wire**

Add the following to Sub-Clause:

The ends of all cable ducts shall be sealed using suitable end caps.

**PSLC 5.9 DUCT ROUTE MARKERS**

Add to Sub-Clause:

The tendered rates shall include for providing the Engineer with the record information and supplying and installing the markers as specified under PSLC 3.4. This information is required by the relevant service authorities.

## **PSLC 8 MEASUREMENT AND PAYMENT**

### **PSLC 8.2.2 Excavation**

Add to Sub-Clause:

Measurement for cable ducts will be done under PSDB – Measurement

### **PSLC 8.2.5 Supply, Lay, Bed And Prove Duct**

Delete Sub-Clause a) and b) and replace with:

#### **PSLC 8.2.5(a) Telkom ducts**

Delete Sub-Clause and replace with:

All pipes, draw wire, screen wire and duct markers will be supplied by Telkom to the construction site at no cost to the Contractor. All ducts shall have a minimum cover of 600mm from finished road level to the top of the pipe. All ducts are to extend 1 000mm either side of the road edge. Trench width for single and double pipes shall be 375 mm and 450mm respectively.

The tendered rate shall include full compensation to install the ducts as specified. Excavation and backfilling shall be measured under items specified for trench excavation. The unit of measurement shall be

Unit: m

#### **PSLC 8.2.5(b) Electricity ducts**

Delete Sub-Clause and replace with:

The ducts shall consist of the indicated number and size as specified in the Bill of Quantities. All ducts are to be laid at 800mm below finished road level and the pipe must protrude 500mm into the footpath or road verge on either side. Both ends of each duct must be sealed with an end cap. In addition it is essential that the location of the ducts must be marked on site and to facilitate subsequent location, suitable kerb or markers shall be obtained from the Service Units Depot. These kerbs or markers will be supplied free of charge.

The tendered rate shall include full compensation to supply, lay, bed and prove the ducts as specified. The tendered rate shall include for obtaining the kerbs or markers from the Service Units Depot and placing them where required.

Excavation and backfilling shall be measured under items specified for trench excavation. The unit of measurement shall be.

Unit: m

**PSLC 8.2.5(c) Water ducts (New sub-clause)**

Add new Sub-Clause:

The ducts shall consist of the indicated number, class, material and size as specified in the Bill of Quantities. Ducts shall have a minimum cover of 600mm and a maximum cover of 800mm measured from the top of the kerb. The duct shall be stenciled with 40 mm letters in blue paint on the kerb or road edge as follows : W DUCT. Ducts shall extend at least one metre past the line of the future water main trench and at least 1.5m from the edge of the road on the opposite side of the road. The ends of the ducts shall be blocked off with an end cap to prevent the ingress of soil.

An 8 gauge galvanised wire shall be drawn through the ducts and secured to wooden stakes located approximately 150mm off the cadastral boundary on either side of the road. The tendered rate shall include full compensation to supply, lay, bed and prove the ducts as specified.

Excavation and backfilling shall be measured under items specified for trench excavation. The unit of measurement shall be

Unit: (m)

**PSLC 8.2.8 Cable Markers**

Add to Sub-Clause:

a) Cable duct markers

Unit: No

**PSLC 8.2.10 Construct 450mm By 450mm Precast Portal Culvert For Telkom Fibre Optic Protection Complete With Excavation And Backfill – 0.0m To 1.0m Depth**

Add new Sub-Clause:

The unit of measure shall be the linear metre measured along the soffit of the precast portal culvert installed.

The rate shall cover the cost of supplying, testing, loading, transporting, and off-loading together with provision and placing of the selected granular material where required for bedding and installation, laying, jointing, cutting on site, and waste.

The rate shall also cover the necessary excavation, backfilling and precautionary measures required for the installation.

Unit: m

**PSLD SEWERS (SABS 1200 LD – 1982)****PSLD 3 MATERIALS****PSLD 3.1 PIPES, FITTINGS AND PIPE JOINTS****PSLD 3.1.5 Upvc Pipes**

Amend the following:

uPVC Class 34 heavy duty pipes shall comply with SANS 791 and the relevant SABS Standards and shall be approved of by the Employer's Agent prior to procurement.

**PSLD 3.5 MANHOLES, CHAMBERS, ETC****PSLD 3.5.7 Step Irons**

Replace sub-clause with the following:

Calcamite step irons or similar approved by Employer's Representative, to be used.

**PSLD 3.5.8 Manhole Covers And Frames**

Add the following:

Manhole covers and frames to be heavy duty and lockable.

**PSLD 3.5.9 Manhole Covers And Frames**

Add new sub-clause:

Precast concrete manholes to comply with SANS 1294.

**PSLD 5 CONSTRUCTION****PSLD 5.6 MANHOLES, INSPECTION CHAMBERS, ETC****PSLD 5.6.3 Step Irons**

Add the following:

Step irons to be driven into pre-drilled 25mm diameter by 75mm deep holes and fixed with Lokset S 40 or similar approved.

**PSLD 5.7 CONCRETE CASING TO PIPES**

Add the following:

All sections of the pipe to be concrete encased is to be approved by the Engineers Representative. Pipes to pass the water test and to be filled with water prior to encasement.

**PSLD 7      TESTING****PSLD 7.1      GENERAL****PSLD 7.1.6      Replace With The Following:**

The Contractor is to provide a method statement detailing the test procedure which is to be approved of by the Employer's Representative.

The required test pressure for all pipelines shall be 1250 KPa measured at the lowest point of the pipeline(s) with a maximum elevation difference of 10 metres and maximum horizontal distance of 500 metres between pressure test points.

All costs relating to this work inclusive of water required for testing, scouring, supplying and install blank flanges, spade pieces etc are to be included in the rate for testing. The duration of this test will be minimum of 1 hour.

The pipe section shall not be filled until associated structural concrete has cured for 28 days and attained design strength and all permanent anchors and fasteners are in place.

The pipe shall be filled at a rate that permits the escape of air and does not induce transient pressure surges.

Permissible leakage for pipe = 0 litre/m.

In the event that a pipe section fails the test, the Contractor shall carry out all remedial measures necessary to obtain a successful test of the section at his own expense.

**PSLE        STORMWATER DRAINAGE (SANS 1200LE)****PSLE 3        MATERIALS****PSLE 3.1(A)    Precast Concrete Pipes**

Delete Sub-Clause and replace with:

Concrete pipes shall be of reinforced concrete and shall comply with SANS 677 and be of the class as indicated on the drawings or scheduled in the Bill of Quantities.

**PSLE 3.1 (d)    Skewed ends**

Add to the Sub-Clause:

Wherever required skew ends may be cut on site.

**PSLE 3.1 (f)    Pipes for subsoil drains (New sub-clause)**

Add new Sub-Clause:

Pipes for subsoil drains shall have the specified internal diameter, which shall not be less than 100 mm, and shall be slotted uPVC or HDPE pipes with a wall thickness in accordance with Class 4 pressure pipes to SANS 966.

The size of the perforations in perforated pipes shall in all cases be 8 mm + 1,5mm diameter and the number of perforations per metre shall not be less than 26 for 100 mm pipe and 52 for 150 mm pipe. Perforations shall be spaced in two rows for 100 mm pipes and four rows for 150 mm pipes.

Slotted uPVC or HDPE pipes shall have a slot width of 8 mm with a tolerance of 1,5mm in width. The arrangement of slots shall be to the Employers Agent's approval, but the total slot area shall not be less than specified for the perforations.

**PSLE 3.1 (g)    Upvc Pipes**

Add new Sub-Clause:

uPVC Class 34 heavy duty pipes shall comply with the relevant SABS Standards and shall be approved of by the Employer's Agent prior to procurement.

**PSLE 3.4.1    Bricks**

Add to Sub-Clause:

Cement bricks complying with the relevant requirements of SANS 1215 bricks shall be considered as being acceptable.

**PSLE 3.4.3    Manhole Covers, Grid Inlets, Etc.**

Add to Sub-Clause:

All cast iron fittings shall receive the following corrosion protection:

One coat epoxy zinc chromate oxide primer to SANS 929. The Dry film thickness to be 35 microns. The final two coats to be epoxy tar in different colours, the final coat to be black. The Coating time to be as per the manufacturer's instructions. The Dry film thickness to be 225 microns.

**PSLD 3.5 MANHOLES, CHAMBERS, ETC****PSLD 3.5.7 Step Irons**

Replace sub-clause with the following:

Calcamite step irons or similar approved by Employer's Representative, to be used.

**PSLD 3.5.8 Manhole Covers And Frames**

Add the following:

Manhole covers and frames to be heavy duty and lockable.

**PSLD 3.5.9 Manhole Covers And Frames**

Add new sub-clause:

Precast concrete manholes to comply with SANS 1294.

**PSLE 3.6 CONCRETE (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Concrete shall comply with the relevant requirements of SABS 1200 G or SABS 1200 GA, whichever is included in the project specification.

**PSLE 3.7 PERMEABLE MATERIAL FOR GROUNDWATER DRAINS**

Delete Sub-Clause and replace with:

Permeable filter materials for groundwater drains shall consist of crushed stone of suitable gradings.

Permeable materials shall conform to the following requirements:

Crushed stone shall be clean, hard single sized stone and shall be free from shale, clay and other deleterious substances.

The aggregate crushing value of the stone shall not exceed 30 when tested in accordance with TMH 1 Test Method B1.

**PSLE 5 CONSTRUCTION****PSLE 5.3.1 Culvert Construction After Earth Fill (New Sub-Clause)**

Add new Sub-Clause:

Wherever possible pipes and rectangular culverts shall be laid under trench conditions. The compacted fill shall first be constructed to a height of 300 mm above the culvert before excavating for the culvert.

The trench width shall not exceed the outside diameter of the pipe plus 600 mm. A working width of 600 mm each side shall be allowed for rectangular culverts.

**PSLE 5.2.2 Pipe Culverts**

Add to Sub-Clause:

The bedding for stormwater pipes shall be to the requirements for Class C bedding of SABS 1200 LB, unless otherwise specified or shown on the drawings.

The ogee joints shall be fitted with 200 mm x 6 mm rubber sealing collars conforming to the latest SANS 974 Specification and with a shore hardness of approximately 40 degrees, or alternatively, the ogee joints shall be primed and double wrapped in accordance with the manufacturer's recommendations with 200 mm wide wrapping tape type CDP or similar approved.

### **PSLE 5.2.3 Concrete casing of pipelines**

In second line of the Sub-Clause substitute "Grade 15/19" for "mix 15".

### **PSLE 5.2.6 Construction of Groundwater Drains (New Sub-Clause)**

Add new Sub-Clause:

On completion of excavation the trench shall be lined with geotextile as specified or shown on the drawings.

A layer of permeable material of the class and thickness as shown on the drawings shall be placed on the bottom of the trench and lightly tamped and finished to the required gradient.

Pipes of the type and size required shall then be firmly bedded on the permeable material true to level and grades coupled where required and the trench backfilled in layers not exceeding 100mm with further permeable material to such height above the pipes as shown on the drawing or directed by the Engineer. The permeable material shall be lightly compacted and finished to the required level. The trench must be specially protected against the ingress of water before completing the impermeable layer.

When placing successive layers the lower layer must not be walked on or disturbed more than can be avoided. Care shall be taken to prevent the contamination of permeable material during construction of the groundwater drains and all permeable material contaminated by soil or silt shall be removed and replaced by the Contractor at his own expense.

Where plain butt joint pipes are used they shall be laid firmly together to prevent infiltration of backfill material. Perforated and slotted pipes shall be joined by couplers. Perforated pipes shall be laid with the perforations at the bottom, as instructed.

The higher end of groundwater pipe drains shall be sealed off with a cap or loose concrete cap of Class 20/19 concrete, as shown on the drawings, and at the lower end the pipe drain shall be built into a concrete headwall providing a positive outlet or connected to stormwater pipes or culverts

### **PSLE 5.8 OPEN DRAINS (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Open drains are to be constructed to the details shown on the drawings, or as directed by the Engineer, to the correct line, level and cross-section. The material excavated from open drains is to be stockpiled for future cover.

Measurement of open drain excavation shall be calculated from natural ground level or, in the case of drains within a road reserve, from the reduced level in the road excavation, and payment will be made on a rate per m<sup>3</sup> basis irrespective of depth. The rate is to include for all work required to trim the drain(s) to the correct line and level.

**PSLE 5.9 STONE PITCHING (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Where ordered by the Engineer, open drains, stormwater outlets, etc, shall be pitched with stone. Stone for pitching shall be of good, sound, durable rock of good shape and face, with a minimum size of 100 x 100 x 75 mm deep. Before pitching is commenced, all slopes and surfaces to receive pitching shall be carefully trimmed and dressed to the correct lines and grades. The pitching stones are to be laid with joints broken as much as possible and are to be hammered solid into position to present a regular and uniform surface. All joints are to be grouted to their full depth in 4:1 cement mortar.

Payment for stone pitching will be made at a rate per unit finished area and the rate is to include for all trimming and dressing of the excavation, laying of the stones and grouting of the joints :

Unit : m<sup>2</sup>

**PSLE 5.10 CUTTING OF DRAINAGE PIPES (NEW SUB-CLAUSE)**

Add new Sub-Clause:

As far as possible, culvert lengths shall be such that pipe units need not be cut. Should any straight or skew cuts be necessary, such cutting will not be measured and paid for separately in terms of Sub-Clause 8.2.4 since all additional work required in cutting the pipes as well as the wasted pipe ends shall be regarded as being included in the payment for the supply, lay, joint, bed and test of the relevant pipe culverts, as per Sub-Clause 8.2.1.

**PSLE 8 MEASUREMENT AND PAYMENT****PSLE 8.2 SCHEDULED ITEMS****PSLE 8.2.1 Supply And Lay Concrete Pipe Culverts**

Delete the title of the Sub-Clause and substitute with:

**SUPPLY, LAY, JOINT, BED AND TEST PIPELINES**

Add to Sub-Clause:

The bedding shall be Class C, unless otherwise specified or shown on the drawings.

Add to the Sub-Clause:

The rates shall cover the cost of providing the pipes as well as the cost of laying, bedding, jointing and making connections into manholes and testing the pipeline.

**PSLE 8.2.4 Extra Over Items 8.2.1 And 8.2.2 For Cutting End Units For Culverts On Site**

Delete this Sub-Clause as no extra payment will be made for cutting end units for culverts.

**PSLE 8.2.8 Supply And Install Manholes, Catch Pits And The Like**

Delete the words "but excluding excavation and backfilling, which will be measured separately" and replace with "and including dealing with any excavation (in all materials including disposal of surplus) that is additional to that measured under the item for pipe trench excavation, backfilling and compacting. The rate shall also cover the cost of all

reinforcing, formwork, epoxy coating of cast iron fittings and the requirements complying with the safety and protection requirements of Sub-clause 5.1 of SABS 1200 DB”

#### **PSLE 8.2.14 Subsoil Drains (New Sub-Clause)**

Add new Sub-Clause:

The tendered rate shall cover the cost of acquiring, regardless of distance, the required material from commercial sources, delivering it to points alongside the trench spaced to suit the Contractor’s method of working, plant and labour and the disposal of material displaced by such importation at the designated spoil site.

Excavation for subsoil drains shall be measured as per SANS 1200DB.

#### **PSLE 8.2.15 Minor Drainage Structures (New Sub-Clause)**

Add new Sub-Clause:

Catch pits, manholes, drop inlets and headwalls will be measured and paid for as complete units.

The unit of measurement shall be the number of the particular type, size and category of drainage units supplied, constructed and installed in accordance with the drawings.

The tendered rate shall include for all materials, plant, labour, supervision and incidentals for the construction of the drainage units complete and in accordance with the drawings.

The tendered rate shall further include for all necessary excavation in all materials, backfilling and disposal of surplus materials, formwork, concrete, benching, concrete finish, reinforcement, precast elements, steel channels and grids, step irons and all other items not specifically measured elsewhere necessary for completion of the unit in accordance with the drawings.

The tendered rate shall include for all costs involved in complying with the requirements of the relevant specifications in respect of the individual types of work involved in completion of the units.

The tendered rates shall exclude for excavation in intermediate and hard material, payment for which shall be made as an extra over in the Schedule of Quantities.

Supply, construct and install drainage unit of the type, size category and depth stated in the Bill of Quantities

Unit: No

#### **PSLE 8.2.16 Outlet Headwalls (New Sub-Clause)**

Add new Sub-Clause:

The tendered rate shall cover the cost of all materials, plant, labour, additional excavation and disposal required to construct the headwall complete as per the detail provided for DN375, DN450, DN600, DN900 and DN1500 pipes.

#### **PSLE 8.2.17 Break Into Existing Manhole, Drop Inlet Or Catch Pit And Install New Pipe (New Sub-Clause)**

Add new Sub-Clause:

The unit of measurement shall be the Number (No.)

- i) 375mm diameter pipe
- ii) 450mm diameter pipe
- iii) 600mm diameter pipe
- iv) 900mm diameter pipe

The rate shall include all labour, plant and materials necessary to break into the existing stormwater structures and to install new pipes and repair the benching. The rate shall include for disposing of rubble and excess material, regardless of distance.

**PSLE 8.2.18 Supply, Lay And Bed Slotted Subsoil Pipes 110mm Diam In HDPE (Drainex Or Similar Approved) (New Sub-Clause)**

Add new Sub-Clause:

Unit: m

The rate shall include for supplying, jointing, laying and bedding pipes, lubricants, joints, cutting, trimming and waste. No deductions will be made for specials, junctions, etc. Slotted pipes shall be HDPE pipes to comply with SANS 4427 Part II.

**PSLE 8.2.19 Extra Over Clause PSLE 8.2.18 For Pipe Junctions**

Add new Sub-Clause:

The rate shall include for supplying, jointing and laying all junctions, cutting, trimming and waste, joints and lubricants. Junctions will be made with standard uPVC soil or HDPE and drainage fittings

Unit: No

**PSLE 8.2.20 Extra Over Clause 8.2.18 For Capping Pipe Ends With Geofabric (U24 Or Similar) (New Sub-Clause)**

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to cap pipe end with two layers of geofabric securely tied to the pipe 100mm from the end with binding wire

Unit: No

**PSLE 8.2.21 Extra Over Clause 8.2.18 For Building Pipes Into Manhole (New Sub-Clause)**

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to build subsoil pipes into concrete or brick manholes

Unit: No.

**PSLB 8.2.22 Extra Over Clause 8.2.18 For Rodding Eyes (New Sub-Clause)**

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to construct the rodding eye complete as shown on the project drawings

Unit: No.

**PSLE 8.2.23 Protective Concrete (Grade 20/19 Cover Slabs Complete (1000mm Wide By 150mm Thick) (New Sub-Clause)**

Add new Sub-Clause:

The unit of measure shall be the cubic meter of concrete provided according to the authorised dimensions of the protective concrete cover slabs. The rate shall include preparing the surface, providing and placing a plastic membrane over the granular surface, excavation into the side of the trench (if required), formwork, providing and casting the concrete in 2m long panels and finishing the concrete surface by means of a wood float finish. All plant labour and material costs to construct the protective cover slabs complete, shall be included in the tendered rate

Unit: No

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**PSM           ROADS – (GENERAL) (SABS 1200 M – 1981)****PSM 2           INTERPRETATIONS****PSM 2.2       DEFINITIONS**

A lot shall be one day's work.

**PSM 2.2.30   Add to:**

A lot shall be one day's work.

**PSM 2.2.55   Add to:**

Top Soil : the top layer of soil containing a proportion of decomposed organic material nominally 150 mm thickness

**PSM 7         TESTING****PSM 7.3       ROUTINE INSPECTION AND TESTING**

Delete Sub-Clause and replace with:

The compliance of earthworks and layerworks with respect to layer density shall be determined in accordance with Appendix 8 - Statistical Judgement Plan.

**PSM 7.4       COMPACTION CONTROL**

Add to Sub-Clause:

Refer to Clause PSA 7.3 : Methods of Test

**PSME SUBBASE (SABS 1200 ME – 1981)****PSME 3 MATERIALS****PSME 3.1 CLASSIFICATION FOR EXCAVATLON PURPOSES****PSME 3.1.3 For the rehabilitation of the existing pavement (New sub-clause)**

Add new Sub-Clause:

Subbase	C3 comprising pulverized asphalt insitu recycled with underlying insitu subbase material, stabilized and processed as a single composite layer.
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**PSME 3.1.4 For the rehabilitation of the existing pavement (New sub-clause)**

Subbase	C4 comprising pulverized asphalt insitu recycled with underlying insitu subbase material, stabilized and processed as a single composite layer.
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**PSME 3.2 PHYSICAL PROPERTIES****PSME 3.2.1 Subbase Material**

Add the following:

Materials with properties at variance to the specified requirements may be used in the subbase at the discretion of the Engineer.

d) Region factor 0,75

**PSME 3.2.2 Gravel Shoulder and Gravel Wearing Course Material**

Materials with properties at variance to the specified requirements may be used in the Subbase at the discretion of the Engineer.

**PSME 5 CONSTRUCTION****PSME 5.4 PLACING AND COMPACTION****PSME 5.4.4 Compaction****PSME 5.4.4.2**

in line 4 amend 93% to 95%.

**PSME 5.5.8 Rehabilitation of existing pavement (C3) (New sub-clause)**

Add new Sub-Clause:

The existing asphalt surfacing shall be processed to construct a new C3 stabilised subbase layer for the full road width over the required area. This rehabilitation process of the existing pavement is described hereunder:

Using appropriate equipment (e.g. milling machine), the existing asphalt shall be pre-pulverized to a depth of 100 mm producing a uniform granular layer. After pre-shaping, the cement stabilizing agent shall be spread at a pre-determined rate of application over

the surface to be treated. Appropriate recycling plant (e.g. milling machine) shall be used to insitu stabilize the pre-pulverised asphalt together with the underlying insitu subbase materials in a single pass.

#### **PSME 5.5.9 Rehabilitation of existing pavement (C4) (New sub-clause)**

Add new Sub-Clause:

The existing asphalt surfacing shall be processed to construct a new C4 stabilised subbase layer for the full road width over the required area. This rehabilitation process of the existing pavement is described hereunder:

Using appropriate equipment (e.g. milling machine), the existing asphalt shall be pre-pulverised to a depth of 100 mm producing a uniform granular layer. After pre-shaping, the cement stabilizing agent shall be spread at a pre-determined rate of application over the surface to be treated. Appropriate recycling plant (e.g. milling machine) shall be used to insitu stabilize the pre-pulverised asphalt together with the underlying insitu subbase materials in a single pass.

#### **PSME 5.7 TRANSPORT**

Delete Sub Clause PSME 5.7.1 and PSME 5.7.2 and replace with:

All haulage shall be taken as free haul. No overhaul shall be paid under this contract.

#### **PSME 8 MEASUREMENT AND PAYMENT**

##### **PSME 8.3.11 Insitu reconstruction of existing pavement layers: pre-pulverising (New sub-clause)**

Add new Sub-Clause:

Stabilization of the existing asphalt and insitu subbase material to the specified depth:

(i) 95% of modified AASHTO density (C3) Subbase layer

Unit: m<sup>3</sup>

The unit of measurement shall be the cubic metre of compacted stabilized pavement layer comprising pulverized asphalt and subbase stabilized insitu, the quantity of which shall be calculated from the authorized dimensions of completed layer as shown on the drawings or as directed by the Engineer.

The tendered rate shall include full compensation for the pre-pulverising of the existing asphalt to the specified depth.

The tendered rate shall also include full compensation for spreading the stabilizing agent, mixing by insitu recycling of the pavement layer comprising the blended materials to the specified depth in a single pass, compacting the material as well as the protection and maintenance of the layer and conducting control tests.

The tendered rate shall also include full compensation for curing the stabilized layer and any water, materials, supervision, plant, labour, equipment, tools and incidentals necessary for constructing the specified work. The tendered rate excludes the cost of supplying the stabilizing agent.

##### **PSME 8.3.12 Insitu reconstruction of existing pavement layers: pre pulverising (New sub-clause)**

Add new Sub-Clause:

The stabilization of the existing asphalt and insitu subbase material to the specified depth:

(i) 95% of modified AASHTO density (C4) Subbase layer

Unit: m<sup>3</sup>

The unit of measurement shall be the cubic metre of compacted stabilized pavement layer comprising pulverized asphalt and subbase stabilized insitu, the quantity of which shall be calculated from the authorized dimensions of completed layer as shown on the drawings or as directed by the Engineer.

The tendered rate shall include full compensation for the pre-pulverising of the existing asphalt to the specified depth.

The tendered rate shall also include full compensation for spreading the stabilizing agent, mixing by insitu recycling of the pavement layer comprising the blended materials to the specified depth in a single pass, compacting the material as well as the protection and maintenance of the layer and conducting control tests.

The tendered rate shall also include full compensation for curing the stabilized layer and any water, materials, supervision, plant, labour, equipment, tools and incidentals necessary for constructing the specified work. The tendered rate excludes the cost of supplying the stabilizing agent.

**PSME 8.3.13 Construct 250mm dump rock layer from crushed stone obtained from commercial sources (New sub-clause)**

Add new Sub-Clause:

Dump Rock 75mm max. size. blinded with crusher dust

Unit: m<sup>3</sup>

The tendered rate shall include full compensation for procuring, furnishing and placing all materials and for providing the completed dump rock subbase layer as specified. The rate shall also include for hauling the material from the commercial source to its final position of the road".

**PSMF BASE (SABS 1200 MF – 1981)****PSMF 1 SCOPE****PSMF 1.1**

Add to Sub-Clause:

This section covers the construction of a 150mm G2 graded crushed stone base layer for the roads.

**PSMF 3 MATERIALS****PSMF 3.3 PHYSICAL AND CHEMICAL PROPERTIES****PSMF 3.3.1 Natural Gravel (Stabilised or Unstabilised)**

Materials with properties at variance to the specified requirements may be used in the base at the discretion of the Engineer. The following table will apply for a gravel wearing course.

REQUIREMENTS FOR GRAVEL WEARING COURSE		
PARAMETER	LIMIT	
	TYPE 1	TYPE 2
Maximum size, mm	37,5	37,5
Oversize Index ( $I_o$ ) (maximum), %	$\leq 5$	0
Shrinkage Product ( $S_p$ )	100 - 365 (maximum of 240 preferable)	100 - 240
Grading coefficient ( $G_c$ )	16 - 34	16 - 34
CBR at $\geq 95\%$ modified AASHTO Compaction (soaked value) (minimum), %	$\geq 15$	$\geq 15$
$I_o$ = Oversize Index (percent retained on 37.5mm sieve)		
$S_p$ = Linear shrinkage x (percent passing 0.425mm sieve)		
$G_c$ = (Percent passing 26.5mm - percent passing 2.0mm) x percent passing 4.75mm/100		

**PSMF 3.3.2 Graded Crushed Stone**

Delete "SANS 1083" and replace with "SABS 1200M : 1996 Roads (general)."

Delete Sub-Clause (a) and replace with:

The maximum stone size for the G2 base shall be 37.5mm."

**PSMF 5.4 PLACING AND COMPACTION****PSMF 5.4.1 Placing**

Amend this sub-clause to read:

Before construction of the base is commenced, the Contractor shall ensure that the underlying layer on which the base is to be constructed and the kerbing and channelling have been completed, comply with the requirements of the Specifications covering the underlying layer and kerbing and channelling and have been approved by the Engineer. All cost in situ mountable kerbing, channelling, vehicle entrances, transitions, etc, shall

have been laid for a period of at least 72 hours before construction of the base course is commenced.

**PSMF 5.4.4.1**

Delete Sub-Clause and replace with:

Compaction shall be carried out at the appropriate moisture content (this may be in excess of the O.M. C.) for the type of material used and compaction equipment employed to achieve the required minimum density.

**PSMF 5.4.4.2**

Delete Sub-Clause and replace with:

The G2 base for the roads shall be compacted throughout to a lower Specification limit (LS) Value of 86% of Bulk Relative Density.

**PSMF 5.9      TRANSPORT**

Delete Sub Clause PSMF 5.9.1 and PSMF 5.9.2 and replace with:

All haulage shall be taken as free haul. No overhaul shall be paid under this contract.

**PSMF 7      TESTING****PSMF 7.3      ROUTINE INSPECTION AND TESTING**

Add to Sub-Clause:

All measurements and test results shall be assessed in accordance with Clause 7.3.3, of SABS 1200M : 1996 Roads (General), Appendix B : Statistical Judgement Plan.

The lower specification limit (Ls) applicable to the relative compaction of the G2 base layer for the roads in Table B.5 of SABS 1200M: 1996 shall be 100% MAASHTO density

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**PSMH ASPHALT, BASE AND SURFACING (SABS 1200 MH)****PSMH 1 SCOPE**

Add to Sub-Clause:

This section also covers the supplying and furnishing of materials for the construction of a bituminous double seal. The seal shall be constructed using either 19,0 mm plus 9,5 mm aggregate, of the specified grade.

**PSMH 3 MATERIALS****PSMH 3.2 CURING COAT**

Add to Sub-Clause:

A curing coat will not be required.

**PSMH 3.3 TACK COAT**

Add to Sub-Clause:

A tack coat is required on all joints and under all asphalt layers, where instructed by the Engineer.

The tack coat shall consist of a 30% stable grade emulsion conforming to SANS 309 (Anionic) or SANS 548 (Cationic)."

**PSMH 3.4 BITUMINOUS BINDER****PSMH 3.4.2 Surfacing**

Add to Sub-Clause:

The grade of bituminous binder shall be a 60/70 pen. grade bitumen complying with the requirements of SANS 307.

**PSMH 3.5 AGGREGATES****PSMH 3.5.1 General**

Add to Sub-Clause:

The aggregates shall meet Grade 1 requirements"

**PSMH 3.5.2 Type**

Add to Sub-Clause:

A maximum of 15% natural sand shall be allowed in the combined aggregate for the asphalt surfacing mix.

**PSMH 3.5.4 Bituminous binder absorption**

Delete "1.0%" and replace with "0.5% ".

**PSMH 3.5.5 Sand equivalent**

Delete Sub-Clause and replace with:

The minimum sand equivalent value of the blended aggregate shall be 45.

### PSMH 3.5.6 Grading

Add to Sub-Clause:

The combined aggregate grading for the continuously graded medium surfacing working mix shall be:

**TABLE 2: GRADING FOR COMBINED AGGREGATE FOR SURFACING**

SIEVE SIZE (mm)	CONTINUOUSLY GRADED (MEDIUM)
13,2	100
9,5	82-100
4,75	54-75
2,36	40-57
1,18	27-42
0,6	18-32
0,3	12-23
0,15	7-16
0,075	4-10

The use of run of crusher materials will not be permitted for the production of the mixture. The coarse aggregate shall be accurately proportion from single size aggregate fractions. The Engineer may request a reconsideration of blends to achieve any grading in the given envelope.

The nominal mix proportions by mass shall be as follows:

Aggregate: 93%  
Bitumen: 6%  
Active filler: 1%

The percentage by mass of the material less than 0,005mm as determined by test method A6 of TMH1, shall be less than 1,0% of the combined aggregates, excluding the active filler."

Add the following:

The flakiness of the coarse aggregate when determined in accordance with TMH 1 Method E13, shall not exceed 25 for the following separate sifted-out fractions of the combined aggregate:

- (i) fraction passing through the 19,0mm sieve and retained on the 13,2mm sieve;
- (ii) fraction passing through the 13,2mm sieve and retained on the 9,5mm sieve; and
- (iii) fraction passing through the 9,5mm sieve and retained on the 6,7mm sieve."

### PSMH 3.5.7 Resistance to crushing (New sub-clause)

Add the following:

The aggregate crushing value (ACV) of the coarse aggregate when determined in accordance with TMH 1 method B1, shall not exceed 25."

**PSMK 3.6 MINERAL FILLER****PSMH 8.6.1 Base and continuously graded gap graded surfacing**

Add to Sub-Clause:

For tender purposes, the active filler shall be hydrated calcitic lime.

**PSMH 5 CONSTRUCTION****PSMH 5.1 GENERAL REQUIREMENTS****PSMH 5.1.1(a) For priming**

Add to Sub-Clause:

The prime coat shall not be applied unless the moisture content over the entire depth of the G2 crushed stone base layer is less than 50% of the optimum moisture content.

**PSMH 5.1.1(b) For asphaltting**

Delete the first sentence of Sub-Clause (b) and replace with:

Immediately before a tack coat is applied, the primed surface of the base or of the existing wearing course shall be broomed and cleaned of all loose deleterious material.

The tack coat shall be allowed to dry properly before the asphalt is placed.

**PSMH 5.8 COMPACTION**

Add to Sub-Clause:

The compacted asphalt for the roads shall have a lower specification limit (Ls) for density of at least 95% of the Bulk Relative Density, determined in accordance with TMH1 method C3, on cores from the constructed layer.

The compacted asphalt shall also comply with the specified requirements for surface texture.

**PSMH 5.9 JOINTS**

Add to Sub-Clause:

Whenever the paver stops for more than 30 minutes and/or the material cools down to below rolling temperature (normally 120°C), joints shall be constructed as specified in Sub-Clause 5.9.

Joints shall be cut between existing and new surfacing and shall be a neat straight line parallel to (for longitudinal joints) or at 20° skew (for transverse joints) to the general alignment of the road. All joints shall be saw cut using an approved asphalt saw cutting device.

All joint faces shall be tacked in accordance with Clause 5.1.

**PSMH 8 MEASUREMENT AND PAYMENT****PSMH 8.5.4 Asphalt**

Change the unit of measurement from:

Unit: "t" to Unit: "m<sup>2</sup>"

Add to Sub-Clause:

The unit of measurement shall be the square metre and the quantity shall be calculated as the nett area of roadway surfaced in accordance with the drawings.

#### **PSMH 8.6 REINSTATEMENT OF ALL SURFACES (NEW SUB-CLAUSE)**

New to Sub-Clause:

Each Tenderer shall include in his tender allowances to cover the costs of reinstating all surfaces and inclusive of all layers to their conditions pertaining before the commencement of construction.

Items have been included in the Bill of Quantities to cover the reinstatement of certain surfaces (grassed lawns, concrete and/or asphalted/gravel driveways and/or roads) and for payment purposes, the area of those specific surfaces shall be calculated from the product of the length of the trench and the specified trench width plus 400 mm (refer PSDB 5.4).

The Contractor is to include in his tender for the reinstatement of all surfaces to the original condition prevailing before the commencement of construction.

In addition, where driveways are to be regraded as a result of the road realignments, the area of those specific surfaces shall be calculated from the product of the length and the width of the section of the driveway that has been regraded.

The reinstatement of all the abovementioned surfaces shall be inclusive of kerbing.

Reinstate bitumen driveways and footways and kerb	Unit: m <sup>2</sup>
Reinstate paved (brick) driveways and footways and kerb	Unit: m <sup>2</sup>
Reinstate paved (cobble) driveways and footways and kerb	Unit: m <sup>2</sup>
Reinstate concrete driveways and footways and kerb	Unit: m <sup>2</sup>

**PSMK KERBING AND CHANNELING (SABS 1200MK)****PSMK 8 MEASUREMENT AND PAYMENT****PSMK 8.2 SCHEDULED ITEMS****PSMK 8.2.2 Concrete Kerbing And Channeling Combined**

Add to Sub-Clause:

Only the standard details shown on drawings will be paid for per metre. The rate tendered shall include for all excavation, surface preparation, formwork, materials (including mesh where shown) and finishing to construct the complete kerbs/channels as detailed.

In all other areas where a non-standard profile is to be constructed (as instructed by the Engineer) excavation shall be measured separately. Concrete shall be measured per cubic metre of concrete placed to the neat dimensions as instructed by the Engineer. (Nominal depth will vary between 100mm and 200mm.) The rate tendered for concrete in open drains and channels shall include for preparing the surface to receive concrete, the concrete itself and any floating required to achieve the specified surface finish. Mesh reinforcement, where required, will be measured separately.

**PSMM ANCILLARY ROAD WORKS (SABS 1200MM)****PSMK 2.1 SUPPORTING SPECIFICATIONS**

Add to Sub-Clause:

The South African Road Traffic Signs Manual (1993) forms part of this specification as well as the attached Transportation Management Plan.

**PSMM 3 MATERIALS****PSMM 3.1 GUARDRAILS, POSTS AND REFLECTOR PLATES****PSMM 3.1.1 Guardrails**

Add to Sub-Clause:

Guardrails and end wings shall be galvanised with a hot-dip (galvanised) zinc coating which complies with the requirements of SANS 763 for the coating of type A 1 articles. All bolts, nuts and washers shall have a hot-dip (galvanised) zinc coating which complies with the requirements of SANS 763 for the coating of type C1 articles.

**PSMM 3.1.2.1 Timber**

Add to Sub-Clause:

Timber for use in guardrail posts and spacer blocks shall be treated hardwood.

**PSMM 3.2 ROAD SIGNS****PSMM 3.2.1 General**

Add to Sub-Clause:

Road signs are not detailed on the drawings. They shall, however, conform to the requirements of the latest South African Road Traffic Signs Manual.  
The supports do not require breakaway devices

### **PSMM 3.2.9 Retro-reflective material**

Add to Sub-Clause:

The background for the signs shall be reflectorised and the material shall be of engineering grade complying with the requirements of CKS 191.

## **PSMM 5 CONSTRUCTION**

### **PSMM 5.2 ROAD SIGNS**

#### **PSMM 5.2.1 Manufacture of supports and backing plates**

##### **PSMM 5.2.1.1 Supports**

Add to Sub-Clause:

The supports shall be 60mm nominal diameter galvanised tubing to SANS 657 with a nominal wall thickness of 2,0mm.

Each support shall be drilled as necessary to support the relevant sign and shall have a 12mm mild steel rod, 200mm long, welded in position in a hole drilled at right angles to the axis of the tube, at 85mm from the lower end, so as to project equally on either side of the tube and prevent the tube from being rotated when erected.

All structural members used shall be treated to resist corrosion by hot dipped galvanising and by painting with one coat of calcium plumbate primer and two coats of grey enamel. All structural members used with aluminium sign faces shall be properly insulated against galvanic action by painting the contact surfaces with an approved bitumastic paint and shall be bolted together with 12,7mm (1/2") diameter cadmium plated bolts.

##### **PSMM 5.2.1.2 Backing plates and boards**

Add to Sub-Clause:

Statutory signs shall be constructed from 2,0mm thick aluminium alloy flat sheet to BS EN 485-2:2008 hardened to 3/4 :H. The signs shall have suitable mounting brackets to facilitate mounting to the supports. Stainless steel mounting bolts are preferred and should be insulated from the aluminium by suitable plastic washers.

#### **PSMM 5.2.4 Erection of road signs**

Add to Sub-Clause:

Road signs shall be erected so that the lower edge of the sign is a minimum of 2,10m above final ground level.

#### **PSMM 5.3.6 Road studs**

Add to Sub-Clause:

Roadstuds shall be extruded aluminium "Lynkor Lynx" with a 43 element reflector fitted with a M10 x 35mm anchor shank for use on asphalt surfacings.

All roadstuds are to be installed by the manufacturer or an approved and registered sub-contractor or the manufacturer.

## **SMM 5.5 ACCOMMODATION OF TRAFFIC (NEW SUB-CLAUSE)**

Add new Sub-Clause:

Subject to the provision contained in SABS 1200 MM: 1984, the tendered rates shall include for the following:

### **PSMM 5.5.1 Scope (New sub-clause)**

Add new Sub-Clause:

This section covers the construction and maintenance of the necessary temporary deviations and detours, barricades and signs, and everything necessary for the safe and easy passage of all public traffic during the construction and maintenance periods, and also the obliteration of temporary deviations as they become redundant. The section also covers the accommodation of traffic on existing roads without the deviation of traffic onto temporary deviations.

### **PSMM 5.5.2 General requirements (New sub-clause)**

Add new Sub-Clause:

#### **(a) Safety**

The Contractor shall be responsible for the safe and easy passage of public traffic past and/or over sections of roads of which he has occupation. Traffic accommodation and temporary construction signing is the sole responsibility of the Contractor. The Contractor shall at all times in all his operations and in using his construction plant, take the necessary care to protect the public and to facilitate the flow of traffic. The Contractor may not commence with any part of the works before he has made adequate provision for the accommodation of traffic.

If work has to be done under traffic, the Contractor shall see to it that his employees are clearly visible. In order to ensure that the traffic accommodation strategies are performing as intended, the Contractor shall monitor and maintain traffic accommodation at the work zone on a regular basis.

The Contractor shall monitor all traffic control devices, temporary signing and roadway conditions during periods of inactivity. The frequency of inspection shall be commensurate with the traffic volumes in the sector and under no circumstances shall consecutive inspections be more than six hours apart, unless otherwise agreed by the Engineer. All site inspections shall be documented by the Contractor and made available for the Engineers review upon request. The traffic accommodation measures will be monitored by the Engineer and if, in the opinion of the Engineer, traffic is being unduly hindered, the Contractor may be required to modify his traffic accommodation measures.

In cases where the Contractor is not in compliance with the specifications and, in the opinion of the Engineer, there is imminent danger to the travelling public, the Engineer has the authority to order the immediate suspension of Work until the required improvements to the situation have been made.

In other cases, where the Contractor is not in compliance with the specifications but, in the opinion of the Engineer, the infraction is not causing imminent danger to the travelling public, the Engineer will use the following escalating process to address the situation:

- (i) Issue verbal instructions requiring the Contractor to correct the infraction
- (ii) Issue a written warning instructing the Contractor to correct the infraction

- (iii) Issue a written order instructing the Contractor to suspend Work until the infraction is corrected to the satisfaction of the Engineer.

**(b) Providing temporary deviations**

Except where the existing road is to remain in use for through traffic, the Contractor shall provide, construct or put in order such temporary deviations as may be required for deviating traffic from such sections of the road as are handed over to him.

Should the Contractor prefer to build temporary deviations at his own initiative in stead of complying with the requirements of the specifications, he shall obtain the Engineer's prior written approval. If the Engineer's prior written approval has been obtained, the Contractor will be remunerated for the accommodation of traffic up to an amount that does not exceed the tendered amount for the accommodation of traffic in accordance with the specifications.

**(c) Minimum vertical clearance**

The minimum vertical clearance over any section of a temporary deviation shall be 5,2m. If the minimum clearance available is less than 5,2m, the minimum clearance shall be indicated on approved signs at approved locations on and in advance of the obstruction.

**(d) Property and survey beacons**

Where possible, temporary deviations shall be constructed so as not to damage or displace property or trigonometrical-survey beacons. In exceptional cases where this is not possible, the Contractor shall notify the Engineer in good time so that he may arrange to have them suitably referenced before they are displaced.

**(e) Access to properties**

The Contractor shall provide and grant access to persons whose properties fall within or adjoin the area over which he is working. No separate payment will be made for the provision and maintenance of such accesses and facilities, except for access ramps as specified in PSMM 5.5.18.

**f) Approval of temporary deviations**

The need for and details concerning all temporary deviations shall be approved by the Engineer before the construction of such temporary deviations commences, and the Contractor shall satisfy himself before tendering that he can make arrangements in respect of any temporary deviations as may be necessary for the safe and convenient passage of traffic.

**g) Temporary works**

The temporary deviations provided by the Contractor shall include the construction of temporary gates, fences, drainage works, and other incidentals considered by the Engineer to be necessary.

**h) Public services**

Public services affected by temporary deviations shall be treated in a similar manner as services affected by the permanent works and payment shall be made in accordance with the provisions of SABS 1200A Clause 8.8.4.

**i) Traffic Safety Officer**

The safety of the traveling public is of utmost importance and every effort must be made to ensure that all road signs, barricades, delineators, flagmen and speed controls are maintained and are effective and that courtesy is extended to the public at all times.

The Contractor shall appoint a competent person on site who shall be the responsible person for the arrangements and maintenance of all accommodation of traffic measures required for the duration of the contract.

This person shall be referred to as the Traffic Safety Officer, shall have representatives in each sector and shall liaise daily with the Engineer in order to maintain proper traffic

arrangements at all work fronts. The Traffic Safety Officer shall be qualified, trained and experienced in traffic control and must be knowledgeable in the operation of the traffic control devices and other related equipment.

The Traffic Safety Officer shall be required to perform the following duties and this list shall not be deemed to be comprehensive. He/she shall:

- (i) be responsible for keeping the temporary traffic accommodation requirements up to specification 24hours a day 7 day a week
- (ii) compile and maintain a complete daily record of traffic signs installed and the traffic signs sequence at each location during the execution of the contract
- (iii) inspect and report to the Engineer on the state of all required road signs as often as the Engineer may require but in any event not less than once every six hours or at such other intervals as may be specified
- (iv) exercise control in terms of traffic safety over the safe movement of personnel, visitors and plant on site including the wearing of high visibility clothing, the operation of amber flicker lights, and the display and cleanliness of "construction vehicle" signs, all as specified
- (v) exercise responsibility for keeping road signs and traffic cones clean and visible at all times. The Contractor shall remove all bituminous and other foreign matter from road signs and traffic cones or provide new road signs and traffic cones, all at the Contractor's own cost, and all as directed by and to the approval of the Engineer
- (vi) compile complete records of traffic accident scenes which are in any way connected with construction activities, and draw up accident reports (including photographs)
- (vii) attend to the training and performance of flagmen and all other personnel involved in the control of traffic
- (viii) attend to all complaints and claims from the public with regard to traffic safety and report on such matters to the Engineer.
- (ix) Liaise with the Publicity Company staff, appointed by the Employer, in order to ensure that communications effort of the Employer is supported at all times in terms of the guidelines for communication as established during the execution of the Contract.

The Traffic Safety Officer and his representatives shall be provided with suitable transport in order to execute their duties

### **PSMM 5.5.3 Temporary traffic control facilities (New sub-clause)**

Add new Sub-Clause:

The Contractor shall provide, erect and maintain the necessary traffic control devices, road signs, channelization devices, barricades, warning devices, temporary signals and road markings (hereinafter referred to as traffic control facilities), as shown on the drawings and in the Transportation Management Plan, move these traffic control facilities from location to location as required and shall remove them when no longer required. It shall be incumbent upon the Contractor to see to it that the above-mentioned traffic control facilities are present at all time and are functioning properly, but, prior to any section of the road which requires the above facilities being opened to traffic, the Contractor shall submit his proposals in this regard to the Engineer for his information and approval.

The Contractor shall immediately, at any time of the day or night, on a 7 day a week basis, make good any shortcomings to the temporary traffic control facilities, should it become necessary. ( See requirements for 24 hour response teams )

The proceedings, claims, actions, damages and costs which may arise from or be related to the absence or improper functioning or placement of traffic control facilities shall be the responsibility of the Contractor. Traffic control facilities no longer required may be moved

for re-use, and, if no longer suitable for use, shall be replaced without any additional compensation if they are required for re-use.

The type of construction, spacing and placement of traffic control facilities shall be in accordance with the prescriptions and recommendations of the latest edition of the South African Traffic Signs manual, the Transportation Management Plan and in accordance with the instructions and drawings of the Engineer.

The tendered rates shall be deemed to include for the supply, erection, maintenance, operation and relocation of the said traffic control facilities. It shall also include for the replacement of same as and when required.

The various traffic-control facilities which may be required are the following:

**(a) Traffic-control devices**

Traffic-control devices include the use of flagmen, portable STOP and GO-RY signs, and traffic signals, whichever may be required. Traffic signals shall be erected only if so specified in the project specifications or upon an instruction in writing, by the Engineer.

If the road is partially closed and one-way traffic only is allowed over a section of road of which the length exceeds 250m, the traffic shall be regulated by flagmen and STOP and GO-RY signs at both ends of such section. It is necessary for effective communication between the flagmen. An approved two-way communication system shall be in operation at the control points.

Temporary traffic control facilities, if applicable, shall be provided with portable stands adequately ballasted with sandbags to prevent the signs from being blown over by wind or wind turbulence from moving traffic, whenever they are used in a situation where the temporary signs must be relocated frequently.

**(b) Road signs and barricades**

Road signs shall include all the statutorily required road signs in the permanent or temporary series, which shall also include delineators and moveable barricades (the barricade, sign combination type), or an appropriate combination thereof.

**(c) Channelization devices and barricades**

Channelization devices shall include delineators, cones, barricades, guardrails, barriers, road studs or road markings, or any appropriate combination of these devices.

**(d) Road Barriers**

Road Barriers for preventing vehicles from leaving the permitted lanes may consist of movable barriers (for example the New Jersey type or similar approved ) of approved construction for separating two opposite traffic streams, or ordinary guardrails.

Should road barriers as specified under PSD, be utilized as part of the layout required for managing traffic in terms of figure 2 to 7 (Transportation Management Plan) additional payment for such barriers will not be applicable as the tendered rates for accommodation of traffic shall be deemed to include for the use of such barriers.

**(e) Warning devices**

All construction vehicles and plant used on the works shall be equipped with rotating amber flashing lights. All lights shall be visible at all times and from all sides. The flashing lights shall be switched on at all times when the vehicles and plant are used on the site for the execution of the works.

Warning boards shall be mounted on construction vehicles and plant and shall be clearly visible. The words CONSTRUCTION VEHICLE shall be displayed on these boards in 250mm high red letter on a white background.

No separate payment will be made for the supply of flashing lights and warning boards and the installation thereof on construction vehicles and plant.

**(f) Road Markings**

Road markings may be required on bituminous and concrete surfaces and will include road-marking studs wherever necessary. Any painted road markings which no longer apply shall be removed. Road-marking studs shall be removed completely.

#### **PSMM 5.5.4 Width and length of temporary deviations (New sub-clause)**

Add new Sub-Clause:

The roadway width of gravel temporary deviations accommodating two-way traffic shall be not less than 10m. Where temporary deviations consist of two separate one-way lanes, the minimum usable width of each lane shall be not less than 5m.

In the case of a two-lane temporary deviation the total width of the carriageway shall be 8.5m and, if a bituminous surface is provided, it shall comprise two lanes of 3.5m width each and centrally located on the roadway. A single lane temporary deviation shall have a 5.0m wide carriageway and, if required, a centrally located 3.5m wide surfaced lane.

Because of the limitation on overtaking in the case of single lane temporary deviations, such deviations shall be as short as possible with a maximum length of 1.0km.

If wider temporary deviations are required, such widths shall be specified in the project specifications and/or on the drawings.

#### **PSMM 5.5.5 Temporary drainage works (New sub-clause)**

Add new Sub-Clause:

All stormwater installations shall be measured under the relevant items in the Bill of Quantities for permanent work.

The Contractor shall adhere to the requirements of the Environmental Management Plan, Stormwater Management Plan which he has to draw up for the construction period and dealing with water in terms of the specifications.

#### **PSMM 5.5.6 Earthworks for temporary deviations or haulage routes (New sub-clause)**

Add new Sub-Clause:

The Contractor shall shape and grade the temporary deviations and shall make full use of all material that can be obtained from alongside the temporary deviations, from side cuts or from the immediate vicinity. If an adequate quantity of material cannot be obtained in this manner, he shall import material from other sources. Where necessary, cuttings shall be made to obtain a satisfactory vertical alignment. The Contractor shall also perform the necessary clearing and grubbing, including the removal of all trees and stumps. Where the subgrade is not sufficiently dense in its natural state, it shall be scarified to a depth of 200mm, mixed, watered, and compacted to 90% of modified AASHTO density.

Any fills which may be necessary for any reason, eg for the construction of fords, shall be constructed and compacted by the Contractor as described above. Wherever possible, fords shall be constructed from rockfill or coarse material so as to limit, in so far as is possible, damage caused by flood waters. The Contractor shall construct cuttings where required.

#### **PSMM 5.5.7 Gravelling of temporary deviations or of existing roads used as temporary deviations or haulage routes (New sub-clause)**

Add new Sub-Clause:

When the earthworks for temporary deviations as described in Clause PSMM 5.5.6 have been completed, those sections of the temporary deviations, as indicated by the Engineer, shall be provided with a wearing course of suitable gravel approved by the Engineer.

The Contractor shall provide, spread, water, mix and compact such material to a density equal to 93% of modified AASHTO density.

If gravel shoulders are to be used for the accommodation of traffic and if the existing shoulders are unsafe for traffic, the shoulders shall be reconstructed as specified. All grass and couch grass shall be bladed from the surface. Approved gravel material shall be imported from the road reserve or from borrow pits. The materials shall be spread, watered, mixed and compacted to 93% of modified AASHTO density in layers of the specified thickness.

**PSMM 5.5.8 Selected gravel layers, crushed stone or asphalt base, stabilisation, and road marking as required for bitumen surfaced temporary deviations and haulage routes (New sub-clause)**

Add new Sub-Clause:

Where specified in the project specifications or required by the Engineer, gravel layers of selected subgrade or subbase quality, crushed-stone base, asphalt base or stabilized gravel layers shall be constructed and road marking shall be done by the Contractor, all in accordance with the requirements of the relevant sections of these specifications and the Engineer's instructions.

**PSMM 5.5.9 Bitumen surfaced temporary deviations and haulage routes (New sub-clause)**

Add new Sub-Clause:

Where required in the project specifications or by the Engineer, temporary deviations shall be provided with bituminous surfacing in accordance with the requirements of SABS 1200MH or of the project specifications, or as may be prescribed by the Engineer.

**PSMM 5.5.10 Existing roads used as temporary deviations (New sub-clause)**

Add new Sub-Clause:

Where existing roads are to be used as temporary deviations, the Contractor shall, after consultation with the owner or authority having control of such road, carry out any repairs, alterations or additions to such roads as may be required to bring them in a condition suitable for traffic. This work will be paid for as stipulated hereinafter.

**PSMM 5.5.11 Existing roads used as haulage routes (New sub-clause)**

Add new Sub-Clause:

Where existing roads are to be used as haulage routes, the Contractor shall, after consultation with the owner or authority having control of such road, carry out any repairs, alterations or additions to such roads as may be required to bring them in a condition suitable for traffic. This work will be paid for as stipulated hereinafter.

**PSMM 5.5.12 Maintenance of temporary gravel deviations and existing gravel roads used as temporary deviations and haulage routes (New sub-clause)**

Add new Sub-Clause:

All gravel temporary deviations and existing gravel roads used as temporary deviations shall be maintained by the Contractor in a safe trafficable condition. Whenever required by the Engineer, the roads and temporary deviations shall be bladed by means of self-propelled road graders to provide a smooth riding surface free from corrugations. All potholes shall be repaired immediately.

The Engineer may also instruct the Contractor to water the temporary deviations to keep down dust or to facilitate the proper blading of the surface. All drainage works shall be maintained in a good working order.

The blading of surfaces of temporary deviations and the application of gravel and water shall be measured and paid for separately, but all other maintenance shall be deemed to be included in the rate tendered for Clause PSMM 8.9.1: Accommodating traffic and maintaining temporary deviations.

**PSMM 5.5.13 Maintenance of temporary deviations with bituminous surfacing and existing roads with bituminous surfacing used as temporary deviations or haulage routes (New sub-clause)**

Add new Sub-Clause:

All roads with bituminous surfacing used by public traffic bypassing construction shall be maintained in a good and safe trafficable condition for the entire period during which such roads are used. Maintenance shall include the patching and repair of the bituminous surfacing, the clearing of shoulders, the clearing of all drains, including culvert inlet and outlet drains, and other incidentals and, unless otherwise specified in the project specifications, also the care and maintenance of all road markings, road signs, delineators and guardrails.

The cost of all maintenance to temporary deviations with bituminous surfacing shall be included in the rates tendered under Clause PSMM 8.9.1: Accommodating traffic and maintaining temporary deviations, except for the cost of repairs to the bituminous surfacing and pavement, which shall be paid for separately under item PSMM 5.5.9.

**PSMM 5.5.14 Accommodation of traffic where the road is constructed in half widths (New sub-clause)**

Add new Sub-Clause:

Where, by reason of difficult terrain or for any other reason, the construction of temporary deviations is unfeasible, the Contractor shall, upon the written instruction of the Engineer, construct the road in half widths to allow traffic to use that half of the road not under construction. The length of the half-width construction shall not exceed the length specified in the project specifications or on the drawings, or the length of the section of road that can be constructed and completed in one day, whichever is the shortest. Provision shall be made for traffic travelling in opposite directions to pass at frequent intervals.

The Contractor shall arrange his work so as to allow traffic to have free one-way access to at least half the width of the roadway at all times during the construction period. He shall maintain that half of the road, which is being used for traffic for the time being, in a trafficable condition, to the satisfaction of the Engineer.

The length of work fronts on roads are to be limited in terms of Clause PS 5 of the Project Specification.

During the day the traffic shall be controlled by a STOP and RY/GO system.

Should the road be not in a safe trafficable condition for two-way traffic over the entire width at the end of each day's work, the Contractor shall provide adequate flagmen, signs, barricades, lights and the necessary staff at his own cost to ensure a reasonably free flow of traffic alternately in each direction throughout the entire period when the roadway is open to one-way traffic only.

**PSMM 5.5.15 Temporary fencing and gates (New sub-clause)**

Add new Sub-Clause:

Where ordered by the Engineer or specified on the drawings or in the project specifications, the Contractor shall make his own arrangements for providing either new fencing and gates or moving and subsequently reinstating existing fencing and gates.

**PSMM 5.5.16 The use of temporary deviations by the contractor (New sub-clause)**

Add new Sub-Clause:

The Contractor shall have the right to use public roads, including temporary deviations open to public traffic, but where his own traffic causes excessive damage or wear to such roads or constitutes a condition hazardous to public traffic, the Engineer shall have the right to regulate the Contractor's traffic over such temporary deviations and require the Contractor to provide, at his own cost, such maintenance, including wearing-course gravel and watering, as in the Engineer's opinion will be necessary in addition to that which would be required to maintain the temporary deviations properly when not used by the Contractor's construction traffic.

#### **PSMM 5.5.17 Obliteration of temporary deviations (New sub-clause)**

Add new Sub-Clause:

When traffic is routed permanently onto the new road, and on the written instructions of the Engineer, the Contractor shall obliterate the temporary deviations and designated sections of obsolete roads and road markings in accordance with section SABS 1200C

#### **PSMM 5.5.18 Access ramps (New sub-clause)**

Add new Sub-Clause:

Access Ramps for vehicles and pedestrians shall be placed across open excavated trenches, at all entrances to properties, where trench excavations obstruct access to these properties. Access Ramps shall be designed by a structural engineer to suit the circumstances of use which includes, but is not limited to: width of trench, loading requirements, stability of pipe trench or whichever design criteria are required or needs to be considered at any specific location.

Access Ramps shall be protected on each side by a stout two-rail timber fence, at least 1.2 m high, consisting of 150 mm x 75 mm timber verticals set firmly into the ground, with 75 mm x 50 mm rails securely fastened to them. At least 4 lamps and reflective markers must be provided at each crossing.

The load limitation of each ramp shall be clearly displayed and the Contractor shall ensure that this limit is in compliance with the required limit of the specific access. The Contractor shall take full responsibility for the adequacy of the Access Ramps.

Access Ramps shall be available at each and every work front for provision of access to properties.

Should access not be provided as a result of non availability of Access Ramps, excavation activities at the specific work front will be stopped until suitable Access Ramps are provided.

The tendered rates for the Access Ramps shall include for design, manufacture, placement, transportation, securing same to the ground, moving when required, provision of hand rails, lights and or any other aspect of the operation of the ramps that may be deemed required.

### **PSMM 8 MEASUREMENT AND PAYMENT**

#### **PSMM 8.2 SCHEDULED ITEMS FOR GUARDRAILS**

#### **PSMM 8.4 SCHEDULED ITEMS FOR ROAD MARKING**

Amend clause PSMM 8.4.1 title as follows:

##### **PSMM 8.4.1 Retro-reflectorised paint applied at a nominal rate of .42P/m<sup>2</sup>**

Amend the last paragraph of item 8.4.1 as follows:

The rate shall cover the cost of supplying all materials (including reflecting glass beads) and equipment necessary and for painting and protection (see 5.3.8), including the setting out of character, symbols and traffic islands marking and including the setting out and

premarking of lines".

#### **PSMM 8.4.3 Road studs**

Add to Sub-Clause:

The type of road studs to be used shall be in terms of Clause PSMM 5.3.6.

#### **PSMM 8.6 REMOVE EXISTING ROAD MARKINGS BY MEANS OF SAND BLASTING**

Add new Sub-Clause:

Unit: m2

The unit of measure shall be the square meter of actual road marking removed or obliterated by means of sandblasting.

The tendered rate shall include for all plant, labour, material, supervision and transportation costs, the necessary equipment, labour and materials, for any specific protection measures, accommodation of traffic and the clearing of the area of all dust, all as specified.

#### **PSMM 8.7 ERECT TIMBER FENCING (POST AND RAIL) USING RECOVERED FENCING MATERIAL**

Add new Sub-Clause:

Unit: m

The unit of measure shall be the linear meter of timber fencing erected using recovered fencing material. The rate shall include for the erection of timber fencing using recovered materials and includes all items and materials necessary to excavate holes, erect fencing, backfill postholes and dispose of surplus materials.

#### **PSMM 8.8 SUPPLY AND ERECT TIMBER FENCING (POST AND RAIL) COMPLETE**

Add New Sub-Clause:

Unit: m

The unit of measure shall be the linear metre of timber fencing (post and rail) erected. The rate shall cover the cost of supplying and erecting the timber fencing (post and rail) excavating and backfilling post holes as well as disposing of the surplus materials.

#### **PSMM 8.9 ACCOMODATION OF TRAFFIC (NEW SUB-CLAUSE)**

Add new Sub-Clause:

##### **PSMM 8.9.1 Accommodating traffic and maintaining temporary deviations**

Add new Sub-Clause:

Unit: km

Unless otherwise stated, all costs including but not limited to the preparation and implementation of the Traffic Control Strategy, the supply and installation, maintenance and removal of all traffic control devices and temporary construction signing, the daily recording of temporary construction signing, the provision of flag persons, graveling, detour design, construction, dust abatement, maintenance, and removal, local road detour preparation, maintenance and restoration, dust abatement; and all labour, materials, equipment, tools, and incidentals necessary to complete the Work to the satisfaction of the Engineer will be considered incidental to the Work. The work shall be measured and paid for once only per kilometer for each type of traffic accommodation, in accordance with the TMP.

The tendered rate shall include full compensation for accommodating traffic and maintaining temporary deviations, including roads constructed in half-widths and existing roads used as temporary deviations during construction and maintenance periods, but excluding maintenance and repair work for which payment is specifically made under the other pay items provided. The tendered rate shall also include full compensation for the

provision of communications equipment required for regulating the traffic, solving traffic problems and complying with the legal requirements of all authorities concerned. The rate will be specified by type as per the Transportation Management Plan and the unit of measurement will be Kilometre for each type. The measurement will be rounded off to the nearest 0.1km at any given setup.

The tendered rate shall be fully inclusive of all material, equipment, personnel and legislative compliance cost necessary to accommodate any interference of traffic for the duration of the contract.

#### Temporary Traffic-Control Facilities:

a) Flagmen	Unit : man-day
b) Portable STOP and GO-RY signs.	Unit : No
c) Amber flicker lights	Unit : No
d) Road signs, R-and TR series (900mm)	Unit : No
e) Road signs, TW series	
(i) (1200mm sides)	Unit : No
(ii) (1800 x 300mm)	Unit : No
(iii) (2400 x 400mm)	Unit : No
f) Movable barriers (plastic barriers).....	Unit : m
g) Delineators (DTG50J) (800 x 200mm reflector size)	
(i) Single	Unit: No.
(ii) Mounted back to back	Unit: No.
h) Traffic Cones (450)	Unit: No

The unit of measurement for (a) shall be a day worked by a flagman. The tendered rate shall include full compensation for a flagman who is required to control traffic by way of flags or portable STOP and GO-RY signs and shall include the provision of flags and safety jackets.

The unit of measurement for (b), (c), (d), (e) and (g) shall be the number of each sign provided, and, as may be applicable, completely erected.

The tendered rates shall include full compensation for providing, and where applicable, erecting each sign complete. In the case of sub-item (b) it shall also include moving the sign as may be necessary.

The unit of measurement for (f) shall be the metre of each type of movable barriers provided and shall include the initial erection.

#### General:

The tendered rate for the respective traffic control facilities shall include full compensation for the supply of an initial erection complete with posts, stakes, portable stands and sandbags as may be required, for cleaning and maintenance, for covering with non-transparent material when temporarily not required and removal off the site when no longer required.

75% of the tariff will be payable when the items have been provided and erected for their first use on site and 25% when finally removed from site. Facilities which become unserviceable or are damaged by vehicles or stolen, in particular delineators, shall be replaced promptly at no additional cost.

The tendered rate shall include for the execution of all tasks and all temporary road signs required in relation to the accommodation of traffic in accordance with SANS 1921-2 (2004): Construction and Management Requirements for Works Contracts, Part 2 : Accommodation of Traffic on Public Roads occupied by the Contractor, SARTSM – Volume 2 Chapter 13.10 Signing Applications for Urban Streets

## PSMM 8.9.2 Earthworks for temporary deviations

Add new Sub-Clause:  
Unit: km

The unit of measurement shall be the kilometer of temporary deviations shaped, compacted and constructed in accordance with the provisions of PSMM 5.5.6 of this section. Where the Contractor has to provide access roads to private property, the length of such access roads outside the road reserve shall also be included in the quantity measured for payment.

The tendered rate shall include full compensation for clearing and grubbing where necessary, the removal of small trees and stumps, the shaping and grading, watering, mixing and compacting of the material and all cuts and fills constructed from material obtained from alongside the temporary deviations or side cut, but including only such portions of the fills which are less than 0,5m in height.

### **PSMM 8.9.3 Cut and borrow to fill**

Add new Sub-Clause:

Unit: m3

The unit of measurement shall be the cubic metre of fill measured in situ from levelled cross-sections taken before and after construction where such material is either imported from a locality more than 100 m from the point of use or is utilized in a portion of a fill which is in excess of 0.5m above the original ground level.

Where measurement by cross-sections is impractical, the volume can be assumed to be equal to 70% of the loose volume measured in trucks in the case of soil and gravel material, and equal to 60% of the loose volume in trucks in the case of hard material consisting predominantly of particles of which the maximum dimension exceeds 100mm.

The tendered rate shall include full compensation for procuring, furnishing and the placing all the classes of material, including transporting over a free-haul distance of 1.0km.

### **PSMM 8.9.4 Cut to spoil**

Add new Sub-Clause:

Unit: m3

The unit of measurement shall be the cubic metre of authorized excavation taken from cut in temporary deviations or removed from fill in temporary deviations which are no longer required and carted to spoil on the instructions of the Engineer, all measured in situ before excavation by means of levelled cross-sections.

The tendered rate shall include full compensation for excavating in all classes of material, loading, transporting, off loading, including the shaping and levelling of spoil material and transporting over a free-haul distance of 1.0km.

### **PSMM 8.9.5 Blading by road grader of:**

Add new Sub-Clause:

Temporary deviations

Unit: km-pass

Existing gravel roads and shoulders used as temporary deviations Unit: km-pass

The unit of measurement for using a road grader to blade the surfaces of temporary deviations, existing roads and existing gravel shoulders used as temporary deviations shall be the kilometer-pass, that is, each kilometer of the full width of the temporary deviation, the entire surface of which has been bladed by one pass of the road grader. In the case of temporary deviations constructed as two separate one-way roads, they shall be considered as one full width of the temporary deviation for purposes of measurement.

Only the number of kilometer-passes actually authorised by the Engineer, in writing, will be measured.

Where the blading of temporary deviations has not been carried out satisfactorily and the surface has not been improved as much as can reasonably be expected from such an

operation, the Contractor shall carry out further grading work at his own expense until a satisfactory result is obtained.

The tendered rate shall include full compensation for providing the road graders and operators, flagmen, guards, barricades, signs and all other costs incidental thereto and for blading the temporary deviations to a smooth surface free from corrugations.

### PSMM 8.9.6 Provision of access ramps

Add new Sub-Clause:

Access Ramps for trench width suitable for DN1600 pipe	Unit: No
Access Ramps for trench width suitable for DN1400 pipe	Unit: No
Access Ramps for trench width suitable for DN1200 pipe	Unit: No
Access Ramps for trench width suitable for DN1000 pipe	Unit: No
Access Ramps for trench width suitable for DN600 pipe	Unit: No
Access Ramps for trench width suitable for DN500 pipe	Unit: No
Access Ramps for trench width suitable for DN400 pipe	Unit: No
Access Ramps for trench width suitable for DN300 pipe or smaller	Unit: No

The tendered rates are deemed to include for the requirements as specified in PSMM 5.5.18.

### C3.3.5 AMENDMENTS TO THE STANDARD SANS 1921 SPECIFICATIONS

The SANS 1921 Volumes 1, 2 and 6 - Construction and Management requirements for works standards and associated specification data are applicable.

Part 1 – General Engineering and construction works

Part 2 – Accommodation of traffic on public roads occupied by the contractor

Part 6 – HIV/AIDS awareness

The following amended specification data is applicable to this Contract:

STANDARD	CLAUSE	SPECIFICATION DATA
<b>SANS 1921-1</b>		
		<b>Essential/Additional/ Amended Data</b>
	4.1.1 (o)	<b>Amend data and add to clause as follows:</b> Record Drawings (As built drawings) to be provided within 30 days of completion of each activity which allows updates of a particular drawing. All record drawings to be submitted as a requirement for Practical Completion certification.
	4.1.2 (b)	<b>Add to sub clause:</b> All wayleave applications will be done and provided by the employer
	4.1.6	<b>Add to sub clause:</b> All spoil shall be managed in terms of the requirements of the applicable environmental legislation and environmental specifications contained here in.
	4.1.8	<b>Add to sub clause:</b> The Contractor shall issue his construction programme to the Employer, in electronic format based on the latest version of MS Project. The Contractor shall refer to the programme clause contained in the Project Specification regarding the programme requirements
	4.1.11	<b>Amend sub clause as follows:</b> One hard copy only will provided
	4.2.1	The strategy in table 1 is "A".
	4.2.2	<b>Amend sub clause as follows:</b> "structural engineer" shall read "the Engineer" or "the Employers representative" depending on applicability of conditions of contract

	4.3	<b>Add sub clause 4.3.4:</b> Refer to section named – PS Construction Programme and add to existing
	4.3.3	<b>Add to sub clause:</b> The Contractor shall provide 24 hours notification.
	4.4	<b>Add to sub clause:</b> Refer to section named – PS Quality Assurance, and add requirements as stated.
	4.7	<b>Add new sub clause 4.7.4:</b> The Contractor shall comply with specification data as stated.
	4.8	<b>Add to sub clause 4.8:</b> The Contractor shall comply with the specification data as stated.
	4.10	<b>Add sub clause 4.10.14:</b> Earthworks and resultant spoil management shall comply with the requirements of the Environmental Management Specification
	4.11.1	<b>Add to sub clause:</b> Minimum testing sequences are specified in the Specification data. The Contractor shall execute more tests than those minimums specified where he deems such testing necessary for exercising adequate quality assurance and control in terms of his quality assurance plan.
	4.11.3	<b>Add to sub clause:</b> The Contractor is referred to additional requirements for records keeping and the presentation of the records. Refer to the requirement of a construction dossier for the Contract, section named Construction Dossier in the project specifications
	4.12.4	<b>Add to sub clause:</b> The Contractor shall ensure compliance with the Specification Data regarding the specific requirements for storage of materials, Plant and equipment.
	4.13.3	<b>Add to sub clause:</b> Compaction equipment shall be suitable for the areas to be compacted and no addition payment will be made for working in limited space conditions other than those rates provided for compaction, which are deemed to include for working under the relevant space conditions and constraints. The Contractor shall ensure that the compaction equipment shall not cause damage to existing infrastructure due to inappropriate use
	4.13.4.1	<b>Replace sub clause as follows:</b> The requirements of the specification data for concrete as stated under the amended specifications for concrete, PSG, are applicable.
	4.14.5	<b>Add to sub clause:</b> The Contractor shall provide ablution facilities for the exclusive use of the Engineer and the Employer's Representative.
	4.15	<b>Add sub clause 4.15.6:</b> The Contractor shall be required to replace plot pegs which had to be removed/covered up as a result of construction activities.
	4.17	<b>Add to sub clauses:</b> Refer to section PS Protection of existing services and relocation of existing services for additional specification data.
	4.18.1	<b>Add to sub clause:</b> The Employer's health and safety specification and requirements are attached to the project specifications and should be complied with at all times.
	4.18.1	<b>Add to sub clause:</b> the amended standard specification as specified in the Project Specification for excavations are to be complied with.
	4.18.2	<b>Add to sub clause:</b> The specification data stated in terms of barricading and lighting is to be complied with
	4.18.3	<b>Add to sub clause:</b> The required legislative requirements for excavations are to be met at all times
	4.18.4	<b>Add to existing sub clause:</b>

		The requirements of the Environmental Management Specification are to be met at all times
	4.19	<b>Add to sub clause:</b> The requirements of the Environmental Management Specification are to be met at all times
<b>SANS 1921-2</b>		
		<b>Essential/Additional/ Amended Data</b>
	3.8	<b>Add to sub clause:</b> The definition of “road reserve” includes the informal road reserves as encountered in informal settlements
	4.2	<b>Add to sub clauses:</b> The requirements of the particular specifications are to be met
	4.2.5	Add to sub clause: the temporary deviation plan shall be submitted to the Employer’s Agent for approval. ( to be read as “the Engineer” where applicable in terms of a specific conditions of contract
	4.5	<b>Add to sub clause:</b> All costs for the maintenance of the said temporary deviations and existing roads used as temporary deviations shall be deemed to have been included in the rates as reflected in the Bill of Quantities. All existing roads used as haul roads for construction purpose shall be maintained to an applicable standard and costs for this maintenance shall be deemed to have been included in the rates shown in the Bill of Quantities.
	4.5.3	<b>Add new sub clause:</b> the Contractor shall execute a photographic survey of roads to be utilised for construction purposes and the record shall be utilised to determine facts for decision making on acceptance of responsibility for maintenance purposes
	4.6.1	<b>Add to sub clause:</b> Half width road construction, where applicable shall be limited to 500m maximum length
	4.6.3	Amend sub clause as follows: The continuous length of road under construction shall be limited to 1000m
	4.6.4	<b>Amend sub clause:</b> the number of sections under construction shall not exceed 2 and spaces between sections, not being worked on shall not be less than 500m
	4.6.5	<b>Add to sub clause:</b> Where agreement is reached with the Employers Agent that road sections shall be closed 24hours a day, this has to comply with the requirements as stated in the Traffic/Transportation Management Plan and agreed to with the Employers Agent in writing
	4.9.2 (i)	<b>Add new sub clause:</b> The Contractor shall ensure that a Traffic safety Office is appointed for the work as defined in order to be able to comply with the requirements of traffic management and control during the execution of the Works. All rates for the execution of the Works are deemed to include for this overhead as and where required
	4.10	<b>Add to sub clause:</b> Temporary Traffic Control mechanisms are detailed under the section named PA – Temporary Traffic Control Mechanisms contained in the Traffic Management Plan or Transportation Management Plan.
<b>SANS 1921-6</b>		
		<b>Essential/Additional/Amended Data</b>
	1 (e)	<b>Add to sub clause:</b> “ Appointment of and HIV/AIDS Awareness Champion.
	4.2.1 (a)	<b>Add to sub clause:</b> A qualified service provider is a provider that appears on the list of recommended service providers, which is available from all regional offices of the Department of Public Works.

		The HIV/AIDS awareness programme shall be repeated at 6 monthly intervals for the duration of the Contract, including an initial programme at the commencement of the Contract.
	4.3.2	<b>Add to sub clause:</b> The HIV/Aids awareness champion and the Employer's representative in this regard shall certify the report and schedule described in cl 4.3.1 whenever a claim for payment is issued to the Employer.

## C3.4: PARTICULAR SPECIFICATIONS

### PREAMBLE

The Particular Specifications form an integral part of the contract and supplements the Standard Specifications. They contain a general description of the works, the site and the requirements to be met.

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

Where Particular Specifications differ from standard specifications, the Particular Specifications take precedence.

### C3.4.1: eTHEKWINI WATER AND SANITATION PARTICULAR SPECIFICATIONS

ITEM #	SPEC REF	DESCRIPTION
C3.4.1.1	PSOH	EWS OH&S: Site Specific Health and Safety Specification
C3.4.1.2	PSOH	EWS OH&S: Baseline Risk Assessment
C3.4.1.3	PEM	EWS Particular Specifications for Environmental Management
C3.4.1.4	PAA	EWS Particular Specifications for Daywork Schedule
C3.4.1.5	PCL	EWS Particular Specifications for Community Liaison Officer (CLO)
C3.4.1.6	PCL	EWS Particular Specifications for Code of Conduct
C3.4.1.7	STPIPE v13	EWS Particular Specifications for Steel Pipe
C3.4.1.8	MSS	Standard Mechanical Specifications
C3.4.1.9	GS	Standard Electrical Specifications
C3.4.1.10		EWS Network and Scada Specifications_Rev2
C3.4.1.11		EWS-Instrumentation Spec rev 4
C3.4.1.12		WS List of Preferred Equipment-05 December 2023-Rev 00
C3.4.1.13		Standard of Building Finishes

### C3.4.2: PROJECT PARTICULAR SPECIFICATIONS

ITEM #	SPEC REF	PARTICULAR SPECIFICATION DESCRIPTION
C3.4.2.1	PSWPE	PUMPING EQUIPMENT
C3.4.2.2	PSECI	ELECTRICAL, CONTROL & INSTRUMENTATION
C3.4.2.3	PSVS	VALVES
C3.4.2.4	PSWM	METERS

### C3.4.3 AMMENDMENTS TO EWS PARTICULAR SPECIFICATIONS

The following amendments have been made on

**C3.4.1.9 MSS Standard Mechanical Specifications.****MSS.10.1.3 Systems to be used**

Replace the third paragraph with:

~~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.~~

Items to be painted: Except where otherwise specified, all metal surfaces shall be painted. This will include hot-dip galvanized items and metal-sprayed coatings if required by the Employer. 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.

### **C3.5: CONTRACT AND STANDARD DRAWINGS**

The drawings issued to tenders as part of the tender documents must be regarded as provisional and preliminary for the tender's benefit to generally assess the scope of work.

The work shall be carried out in accordance with the latest available revision of the drawings approved for construction (AFC). At commencement of the contract, the Engineer shall deliver to the Contractor copies of the AFC drawings and any instructions required for the commencement of the works. From time to time thereafter during the progress of the works, the Engineer may issue further drawings for construction purposes as may be necessary for adequate construction, completion and defects correction of the works.

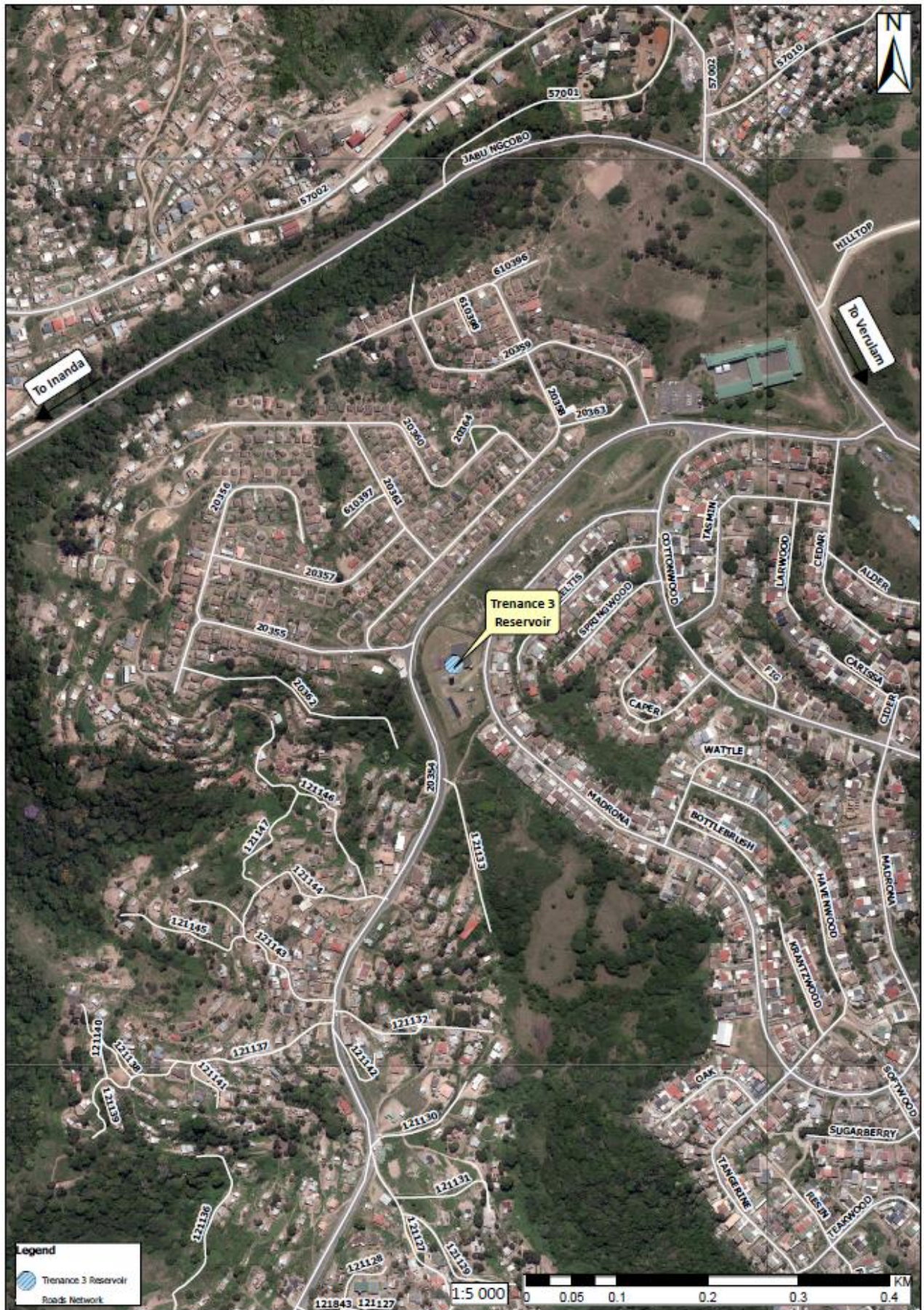
All drawings and specifications and copies thereof remain the property of the Employer, and the Contractor shall return all drawings and copies thereof to the Employer at the completion of the contract.

## **C3.6: ANNEXURES**

Part C3.4 and Part 3.5 are issued separately to this document as Annexures and issued as electronic documents (pdf).for tender purposes.

## PART C4: SITE INFORMATION

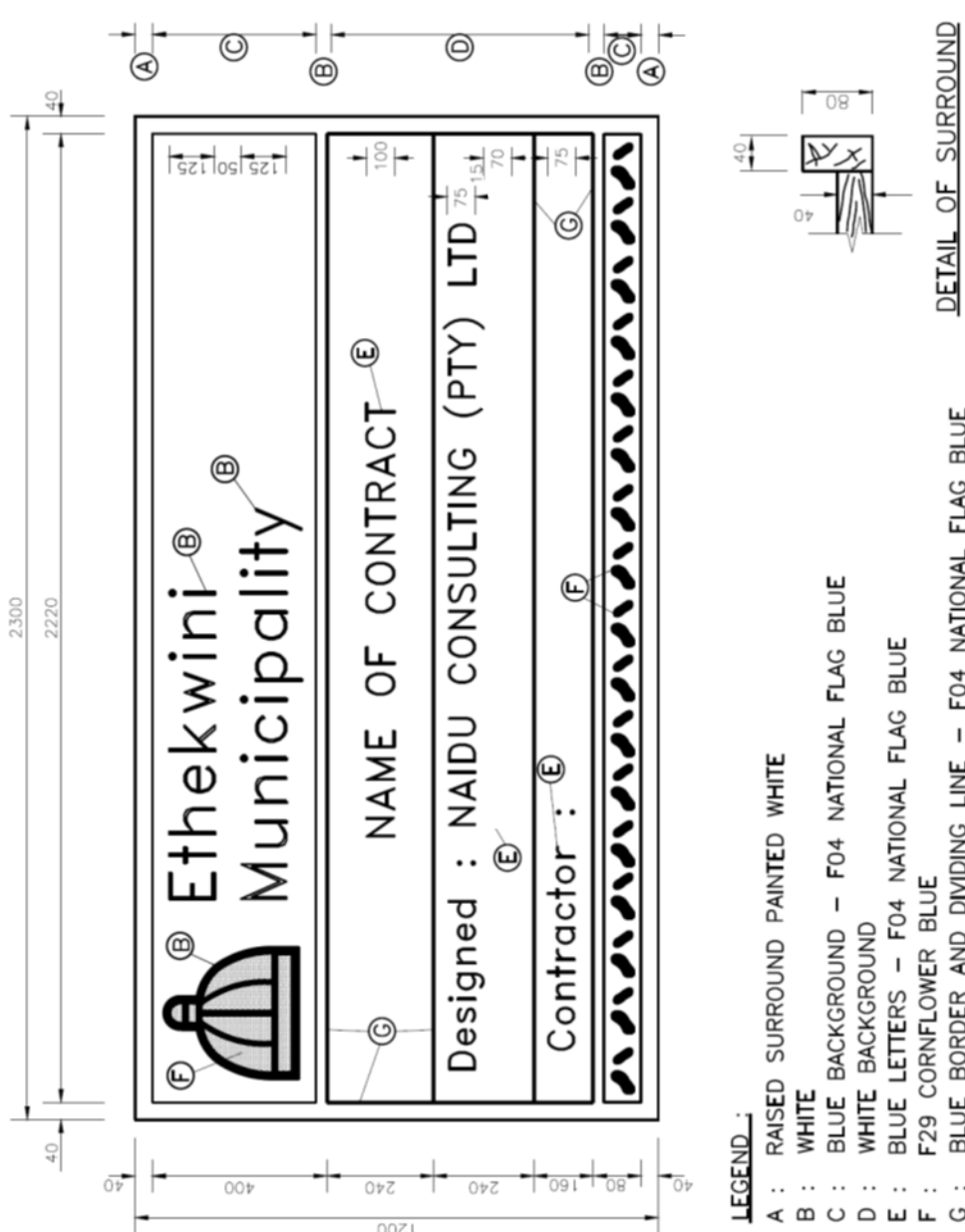
### C4.1 LOCALITY PLAN



#### **C4.2 CONDITIONS ON SITE**

The Contractor shall be deemed to have familiarised himself with the particular site conditions in terms of the requirements of the Conditions of Contract.

The Contractor is to include for any variations due to ground conditions in the tendered rates.

		
<p><b>LEGEND :</b></p> <p>A : RAISED SURROUND PAINTED WHITE</p> <p>B : WHITE</p> <p>C : BLUE BACKGROUND – F04 NATIONAL FLAG BLUE</p> <p>D : WHITE BACKGROUND</p> <p>E : BLUE LETTERS – F04 NATIONAL FLAG BLUE</p> <p>F : F29 CORNFLOWER BLUE</p> <p>G : BLUE BORDER AND DIVIDING LINE – F04 NATIONAL FLAG BLUE</p>		
<p><b>NOTE :</b></p> <p>1) THE FACE TO BE TEMPERED HARDBOARD IN ONE PIECE.</p> <p>2) THE COLOUR NUMBERS REFERRED TO ARE THOSE ON THE COLOUR SPECIFICATION OF S.A.B.S. 1091–1975 (AMENDED 1988)</p> <p>3) ALL DIMENSIONS ARE IN MILLIMETRES.</p> <p>4) ALL TEXT TO BE ROMAN DUPLEX FONT.</p>		
<p><b>DETAIL OF SURROUND</b></p>		
<p><b>ETHEKWINI MUNICIPALITY</b>      <b>WATER DESIGN BRANCH</b></p>		
<p>Drawn by : <i>S.J.M.</i></p> <p>Checked by :</p> <p>Date : <i>MAR 2002</i></p> <p>_____ Manager: Water Design</p>	<p><i>NOTICE BOARD</i></p>	<p>Executive Director: Ethekwini Water Services</p> <p>Plan No: <u>  9  </u></p>