



TENDER COVER PAGE

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF JOHANNESBURG WATER

BID NUMBER: JW14289R

CLOSING DATE: 30 JANUARY 2025

CLOSING TIME: 10:30AM

DESCRIPTION: CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

CIDB REQUIREMENTS: TENDERERS SHOULD HAVE A CIDB CONTRACTOR GRADING DESIGNATION OF 8CE OR HIGHER

BRIEFING SESSION	COMPULSORY		
BRIEFING DETAILS	DATE AND TIME: 02 DECEMBER 2024 AT 13:00 ADDRESS: WOODMEAD RESERVOIR SITE CORNER OF WOODLANDS DRIVE AND JESSICA CLOSE, WOODMEAD, SANDTON, 2191 CO-ORDINATES: 26° 3'20.10"S, 28° 5'21.30"E (-26.055307, 28.089450) ACCESS TO SITE REQUIRES THAT TENDERS WEAR PPE (SAFETY BOOTS, REFLECTOR VEST AND HARD HAT). TENDERRES WHO DO NOT COMPLY WILL NOT BE GRANTED ACCESS. TENDERS RECEIVED FROM NON-ATTENDED BIDDERS OF A COMPULSORY BRIEFING SESSION WILL NOT BE ACCEPTED		
TENDER SUBMISSION DETAILS	BID DOCUMENTS MUST BE DEPOSITED IN THE TENDER BOX SITUATED AT GROUND FLOOR IN JOHANNESBURG WATER ADDRESS: TURBINE HALL, 65 NTEMI PILISO STREET, NEWTOWN, JOHANNESBURG, 2001 PLEASE ALLOW SUFFICIENT TIME TO ACCESS JOHANNESBURG WATER OFFICES IN TURBINE HALL AND DEPOSIT YOUR TENDER DOCUMENT IN THE JOHANNESBURG WATER TENDER BOX SITUATED AT RECEPTION BEFORE TENDER CLOSING TIME. TIMES: THE BUILDING WILL OPEN 7 DAYS A WEEK FROM 06:00 UNTIL 18:00		
BIDDER INFORMATION			
NAME OF BIDDER			
POSTAL ADDRESS			
PHYSICAL ADDRESS			
TELEPHONE NUMBER			
CELLPHONE NUMBER			
E-MAIL ADDRESS			
VAT REGISTRATION NUMBER			
TAX COMPLIANCE STATUS	TCS PIN		MAAA No
OTHER STATUS	COIDA Registration No		CRS(CIDB) No

EMPLOYER INFORMATION			
DEPARTMENT	SCM	DEPARTMENT	PMU
CONTACT PERSON	GCINA NDELA	CONTACT PERSON	SIJABULISO TSHUMA
TELEPHONE NUMBER	011 688 1796	TELEPHONE NUMBER	011 688 1570
E-MAIL ADDRESS	gcina.ndela@jwater.co.za	E-MAIL ADDRESS	sijabuliso.tshuma@jwater.co.za

Employer:	Contractor:
Witness:	Witness:



NOTE: DOCUMENTS DOWNLOADED FROM THE ETENDER PORTAL IS AT NO COST BUT MUST COMPLY WITH SUBMISSION REQUIREMENTS.

WITHOUT LIMITATION, JOHANNESBURG WATER TAKES NO RESPONSIBILITY FOR ANY DELAYS IN ANY COURIER OR POSTAL SYSTEM OR ANY LOGISTICAL DELAYS WITHIN THE PREMISES OF JOHANNESBURG WATER. JOHANNESBURG WATER LIKewise TAKES NO RESPONSIBILITY FOR OFFERS DELIVERED TO A LOCATION OTHER THAN THE TENDER BOX AS PER THE TENDER SUBMISSION DETAILS STATED IN THE TENDER. PROOF OF POSTING OR OF COURIER DELIVERY WILL NOT BE TAKEN BY JOHANNESBURG WATER AS PROOF OF DELIVERY. TENDER SUBMISSION DOCUMENTS MUST BE IN THE BOX BEFORE TENDER CLOSURE.

THE CURRENT JOHANNESBURG WATER SUPPLY CHAIN POLICY IS APPLICABLE WHICH IS AVAILABLE ON THE JW WEBSITE WWW.JOHANNESBURGWATER.CO.ZA

THE TENDERER IS ENCOURAGED TO SIGN THE TENDER SUBMISSION REGISTER WHEN SUBMITTING THEIR TENDERS.

**PLEASE ENSURE YOU SUBMIT 1 x ORIGINAL TENDER HARD DOCUMENT
(IF PRACTICAL, ALSO PROVIDE AN ELECTRONIC COPY IN A MEMORY STICK/USB TO ENSURE INFORMATION IS NOT MISSED WHEN TENDERS ARE BEING EVALUATED BY THE BID EVALUATION COMMITTEE).**

Any documents required that are not submitted in the tender box at the deadline will be considered late.

The tenderer accepts that Johannesburg Water will not take responsibility for the misplacement or premature opening of the tender if the outer package is not sealed and marked as stated.

NB: NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

NAME OF CONTACT PERSON:

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:

DATE:

Employer:		Contractor:	
Witness:		Witness:	



PART B TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

- 1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
- 1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED– (NOT TO BE RE-TYPED) OR ONLINE**
- 1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

2. TAX COMPLIANCE REQUIREMENTS

- 2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
- 2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.
- 2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.
- 2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.
- 2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
- 2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
- 2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

- 3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO
- 3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA? ☐ YES ☐ NO
- 3.3. DOES THE ENTITY HAVE PERMANENT ESTABLISHMENT IN THE RSA? ☐ YES ☐ NO
- 3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? ☐ YES ☐ NO
- 3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? ☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

Employer:		Contractor:	
Witness:		Witness:	



TENDER NOTICE AND INVITATION TO TENDER



1. TENDER NOTICE AND INVITATION TO TENDER

Johannesburg Water (SOC) Ltd invites the tenderer for the following:

CONTRACT NO: JW14289R CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

The tender document will be available in the form of a download from the Johannesburg Water website ([www.johannesburgwater.co.za /supply chain/tenders](http://www.johannesburgwater.co.za/supply_chain/tenders)) starting from 20th November 2024.

The Employer is **Johannesburg Water (SOC) Ltd**

All tenders and supporting documents must be sealed and be placed in the Tender box on the ground floor of Johannesburg Water by no later than 10:30 am on 30th January 2025.

Address is as follows:

TURBINE HALL, 65 NTEMI PILISO STREET, NEWTOWN, JOHANNESBURG, 2001

Johannesburg Water (SOC) Ltd is not obliged to accept the lowest or any tender and Johannesburg Water reserves to appoint:

- a) in whole or in part.
- b) to more than one tenderer.
- c) to the highest points scoring bidder.
- d) to the lowest acceptable tender or highest acceptable tender in terms of the point scoring system.
- e) to a bidder not scoring the highest points (based on objective grounds in terms of section 2 (1) (f) of the PPPFA) (where applicable).
- f) not to consider any bid with justifiable reasons.

A valid and binding contract with the successful tender/s will be concluded once Johannesburg Water has awarded the contract. Johannesburg Water (SOC) Ltd and the successful tenderer/s will sign the contract agreement forms.



Johannesburg Water SOC Ltd



CONTRACT NO: JW14289R

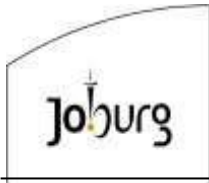
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

VOLUME 1 TENDER AND CONTRACT

Prepared by
PMU
PO Box 61542
Marshalltown
2107

V1.0
August 2023

Employer:		Contractor:	
Witness:		Witness:	



Contract No JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section T1 Tender and Contract



The Tenderer is to indicate in the "Submitted (Yes/No)" column in the below table that they have completed the required section of the tender document. Completion of this checklist will assist the Tenderer in ensuring that they have attended to all the required items for submission with this tender. Additionally, it is an absolute requirement that Tenderers comply with National Treasury's CSD registration as well as SARS tax compliance requirements for contract award – refer T2.2.2.

The below will form part of the tender document, the Tenderers are therefore encouraged to submit the returnable and or documentation with their tender offer to avoid elimination, especially with regards to what is stated in the "Required for Tender Evaluation" column or not obtaining points for Specific Goals. Tenderers are encouraged to ensure that their Tax status remains Tax Compliant on CSD throughout the process to avoid delaying the process or being eliminated at award stage. For infrastructure related projects. Tenderer must have an active CIDB Status with the requested GIDB requirement by evaluation stage of this tender to avoid disqualification.

All documentation listed in the Checklist below shall form part of the Contract.

Table 1

Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
1	Tender Cover:				
	Name of Tender	•			
	Contact Person	•			
	Telephone Number	•			
	Central Supplier Database Registration	•			
	CIDB Registration Number	•			
	COIDA Registration Number			•	
	Tax SARS PIN No.		•		
	MAAA No. for Tax Compliant Status		•		
	Bank Details Form		•		
2	Mandatory Documents at Particular Stage:				
	CIBD grading 8CE or higher or Proof of registration with minimum required CIDB grading for the tender and Active Status	•			
	Mandatory Tender Briefing Meeting	•			
	Complete and sign the Form of Offer	•			
3	Administrative Documentation:				
T2.1	Signed Certificate of Authority to Sign	•	•		
	MBD 1 - Invitation to Bid - Completed and signed	•	•		
	Central Supplier Database Registration	•			
T2.2.4	MBD 4 - Declaration of interest - Completed and signed	•	•		
	MBD 5 - Declaration for procurement above R10 Million (all applicable taxes included) Completed and signed.	•	•		

Employer:		Contractor:	
Witness:		Witness:	



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CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section T1 Tender and Contract



Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	MBD 6.1 - Preference Points Schedule – Specific Goals and Price Points - Completed and signed.	•			
	Acknowledgement of Project Tender Drawings	•			
	Acknowledgement of SHE Specification & Annexures	•			
T2.2.4	MBD 8 - Bidder's past supply chain management practices – Completed and signed.	•	•		
T2.2.4	MBD 9 - Certificate of Independent Bid Determination – Completed and signed.	•	•		
	Municipal Rates and Taxes for the Tenderer - Current municipal rates for the entity not older than 90 days (if leasing/renting, submitted proof such as lease agreement where premises are rented), OR Confirmation that suitable arrangements are in place for arrear municipal obligations with your local municipality. OR Current municipal rates which is not older than 90 days or valid lease agreement with affidavit from owner of property in cases stated in Proof of Good Standing with Regards to Municipal Accounts document in the Tender.	•	•		
	Municipal Rates and Taxes - Current municipal rates for the directors of the entity not older than 90 days (if leasing/renting, submitted proof such of lease agreement where premises are rented), OR Confirmation that suitable arrangements are in place for arrear municipal obligations with your local municipality. OR Current municipal rates which is not older than 90 days or valid lease agreement with affidavit from owner of property in cases stated in Proof of Good Standing with Regards to	•	•		

Employer:		Contractor:	
Witness:		Witness:	

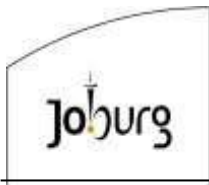


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Volume 1 Tender and Contract
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Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	Municipal Accounts document in the Tender				
	3-year financial statements (audited where applicable)		•		
	Joint Venture Consortium or equivalent Agreement signed by all parties if applicable	•	•		
	Any qualifications. If "Yes", reference to such qualification/s must be indicated on a cover letter. Please be aware that alterations on the tender document may result in your tender being eliminated as the qualification may impede on the ability to evaluate like with like.	•			
4.	Functionality Documentation:				
	Documentary Evidence Required for Criteria 1 - (CVs of Key Personnel)	•			
	Documentary Evidence Required for Criteria 2 – (Certified Qualification Certificates of Key Personnel and valid registrations)	•			
	Documentary Evidence Required for Criteria 3 – (Contactable Reference Letters for Applicable Completed Projects)	•			
	Documentary Evidence Required 4 – (Completion/Approval Certificates of related Projects)	•			
	Documentary Evidence Required for Criteria 5 – (Appointment Letters where additional information is not available on completion certificate)	•			
	Documentary Evidence Required 6 – (Site Specific Method Statement and generic construction programme)	•			
5.	Specific Goals:				
	Documentary Evidence Required for Criteria 1 – (Valid Construction Sector BBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR CIPC registration document showing	•			

Employer:		Contractor:	
Witness:		Witness:	

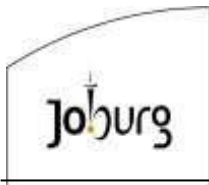


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Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	percentage of ownership and share certificate where applicable))				
	Documentary Evidence Required 2 – Entity Rates and Taxes [Or Lease Agreement] as proof of Locality, Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address. Businesses that operate from personal properties are required to submit an affidavit)	•			
	Documentary Evidence Required 3 – (CIPC registration document showing percentage of ownership and share certificate where applicable))	•			
	Documentary Evidence Required 4 – (Sworn Affidavit from Ward Councilor as proof of Business Address or letter from the Ward Council confirming the business address. Businesses that operate from personal properties are required to submit an affidavit)	•			
7.	Scope of Work:				
	Scope of Work and or Specifications	•			
8.	Pricing Schedule:				
	Pricing Schedule completed in accordance with the award strategy	•			
	Alterations authenticated – Refer to Conditions of Tender	•			
	Bill of Quantities	•			
9.	Site Information:				
	Site Information	•			
10.	Occupational Health, Safety and Environmental Specification				
	Acknowledgement of SHE Specification & Annexures	•			
11.	Tender Drawings				
	Acknowledgement of Project Tender Drawings	•			
12.	Terms and Conditions:				
	General Conditions of Contract	•			
	Special Conditions	•			
	Tender Data	•			
	Pricing Data	•	•		
10.	Other Documents				

Employer:		Contractor:	
Witness:		Witness:	



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Volume 1 Tender and Contract
Section T1 Tender and Contract



Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	Form of Acceptance (do not complete Form of Acceptance it will be completed by JW official)			•	
	Public Liability Insurance			•	
	Valid Registration with Compensation for Occupation Injuries and Diseases Act			•	
	Performance Guarantee – where applicable for industrial related services			•	
	Comprehensive Health and Safety Plan (Compliance with OHSE Specification - if Applicable)			•	
	Bank Details Form			•	

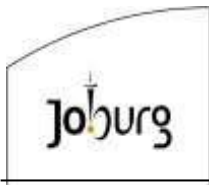
Tenderers will be notified of any omitted, outstanding, missing and or incomplete administrative documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other administrative documents that require completion and signatures. These exclude documentation on functionality, price, points for specific goals and MBD6.2 Local Production and Content.

Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed.

If locality is a specific goal in MBD6.1 – the requested documentation may not be used to allocate points for specific goals.

Signature: _____ Date _____

Employer:		Contractor:	
Witness:		Witness:	



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Volume 1 Tender and Contract
Section T1 Tender and Contract



CONTENTS OF TENDER DOCUMENT:

Volumes	Contents	
Number	Number	Heading
Volume 1	Part 1: Tender Procedures	
	T1.1	Tender Data
	Part 2: Returnable Documents	
	T2.1	List of Returnable Documents
	T2.2	Returnable Schedules
	Part 1: Agreement and Contract Data	
	C1.1	Form of Offer and Acceptance
	C1.2	Contract Data
	C1.3	Forms of Securities
	Part 2: Pricing Data	
	C2.1	Pricing Instructions
	C2.2	Bill of Quantities
	Volume 2A	Part 3: Scope of Work
C3		Scope of Work
Volume 2B		Particular Specifications
Volume 2A	Part 4: Site Information	
	C4	Site Information
Volume 3		Occupational Health and Safety Specification and Environmental Management Plan
Volume 4		Tender Drawings

Only Volume 1 and Volume 2A and 2B must be returned.

Employer:		Contractor:	
Witness:		Witness:	



Johannesburg Water (SOC) Ltd



CONTRACT NO: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

VOLUME 1

PART 1: TENDERING PROCEDURES

Employer:		Contractor:	
Witness:		Witness:	



T1.1 TENDER DATA

T1.1.1 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 (August 2019). (See www.cidb.org.za).

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

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

T1.1.2 Tender Data

The clause numbers in the Tender Data refer to the corresponding clause numbers in the Conditions of Tender.

The additional Conditions of Tender are:

Clause number	Tender Data
C.1.1	The Employer is, Johannesburg Water (SOC) Limited
C.1.2	The tender documents issued by the Employer comprise: Volume 1 Tender Part 1: Tendering Procedures T1.1 Tender Notice and Invitation to Tender T1.2 Tender Data Tender Part 2: Returnable Documents T2.1 List of Returnable Documents T2.2 Returnable Schedules, including the Enterprise Declaration Affidavit which may be bound in a separate volume. Contract Part 1: Agreement and Contract Data C1.1 Form of Offer and Acceptance C1.2 Contract Data C1.3 Forms of Securities Contract Part 2: Pricing Data C2.1 Pricing Instructions C2.2 Bill of Quantities Volume 2A Contract Part 3: Scope of Work C3.1 Scope of Work C3.2 Particular Specifications

Employer:		Contractor:	
Witness:		Witness:	



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Employer:		Contractor:	
Witness:		Witness:	



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Volume 1 Tender and Contract
Section T1 Tendering Procedures



Clause number	Tender Data
	Contract Part 4: Site Information C4 Site Information Volume 2B Generic Specifications Volume 3 Occupational Health, Safety and Environmental Specification Environmental Management Plan Volume 4 Tender Drawings
C.1.4	The Employer's representative is: The Employer's representative is: Contact Person: Sijabuliso Tshuma Telephone: 011 688 1570 E-mail address: sijabuliso.tshuma@jwater.co.za The SCM representative is Contact Person: Gcina Ndela Telephone: 011 688 1796 E-mail address: gcina.ndela@jwater.co.za
C.2.1	Eligibility criteria and requirements CIDB registration and grading: 1) Only tenderers who are registered with the CIDB and were capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 8CE class of construction work, are eligible to submit tenders. Tenders must have an Active status at the required CIDB grading at time of tender evaluation for the bidder to meet the eligibility criteria and requirement. 2) Joint ventures are eligible to submit tenders provided that: i) Every member of the joint venture is registered with the CIDB; and ii) The combined contractor grading designation calculated in accordance with the CIDB Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 8CE class of construction work. Failure to meet to Eligibility criteria and requirements will result in disqualification.
C.2.7	Tenderers should forward their contact details to the contact persons as stated on the Tender Cover Page and Invitation to Tender so that they will be sent any communication pertaining to this tender.

Employer:		Contractor:	
Witness:		Witness:	



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Clause number	Tender Data
C.2.8	Replace the contents of the clause with the following: “Request clarification of the tender documents, if necessary, by notifying the Employer’s Officials indicated on the Tender Notice and Invitation to Tender in writing at least seven (7) working days before the closing time stated in the foregoing notice and clause C.2.15.1”
C.2.9	Add the following to the clause: “Accept that the submission of a Tender shall be construed as an acknowledgement by the Tenderer that they are satisfied with the insurance cover, the Employer will affect under the contract.”
C.2.10.5	Add the following to the clause: A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered will be inclusive and covered by the other prices in the Schedule. “If no offer is made for an item, it will be interpreted as a zero rate for the item. All prices and details must be legible / readable to ensure the tender will be considered for adjudication.”

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section T1 Tendering Procedures



Clause number	Tender Data																
C.2.11	The evaluation on price alteration will be conducted as follows: Where the tender award strategy is to evaluate and award per item or category, the following must apply: a) If there is an alteration in the rate but no alteration on the total for the item or category, the bidder will not be disqualified. b) If there is an alteration on the total for the item/s without authentication, bidders will only be disqualified for alteration per item or category. Where the tender award strategy is to evaluate and award total bid offer, the following must apply: a) If there is an alteration on the rate, total for the line item, sub-total/ sum brought/carried forward for the section but no alteration on the total bid offer, the bidder will not be disqualified. b) If there is an alteration on the total bid offer on "Form of Offer" then the amount in words must be considered or vice-versa. c) If there is an unauthenticated alteration on the total bid offer and the amount in words is not authenticated, the bidders will be disqualified for the entire tender. Where the tender pricing schedule or bill of quantities is requesting rates/price from bidder/s without providing a total, the following will apply: a) (i) If there is an unauthenticated alteration on the unit rate/price the bidder must be disqualified. Please note: Corrections may not be made using correction fluid, correction tape or the like, bid received contrary to this will be disqualified.																
C.2.12.1	Replace Contents Alternative offers will not be permitted.																
C.2.12.2	Failure to complete and sign the form of offer in full will result in the elimination of the tender.																
C.2.13.3	Each tender offer shall be submitted as an original. Tenderers are also requested to submit a soft copy in a USB (Tenderers who do not submit a soft copy will not be disqualified).																
C.2.13.5	The Employer's address for delivery of tender offers and identification details to be shown on the Tenderer's offer package are: <table border="0"> <tr> <td>Location of tender box:</td><td>Ground Floor Entrance</td></tr> <tr> <td>Physical address:</td><td>Johannesburg Water (SOC) Ltd</td></tr> <tr> <td></td><td>Turbine Hall</td></tr> <tr> <td></td><td>65 Ntemi Piliso Street</td></tr> <tr> <td></td><td>Newtown</td></tr> <tr> <td></td><td>Johannesburg</td></tr> <tr> <td></td><td>2001</td></tr> <tr> <td>Identification details:</td><td>Tender reference number, Title of Tender and the closing</td></tr> </table>	Location of tender box:	Ground Floor Entrance	Physical address:	Johannesburg Water (SOC) Ltd		Turbine Hall		65 Ntemi Piliso Street		Newtown		Johannesburg		2001	Identification details:	Tender reference number, Title of Tender and the closing
Location of tender box:	Ground Floor Entrance																
Physical address:	Johannesburg Water (SOC) Ltd																
	Turbine Hall																
	65 Ntemi Piliso Street																
	Newtown																
	Johannesburg																
	2001																
Identification details:	Tender reference number, Title of Tender and the closing																

Employer:		Contractor:	
Witness:		Witness:	



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	date and time of the tender, as well as the <i>Tenderer's name, their Authorised Representative's name, postal address and telephonic contact numbers.</i>
C.2.13.6 & C.3.5	A two-envelope procedure will not be followed.
C.2.15.1	The closing time for submission of tender offers is as stated in the Tender Notice and Invitation to Tender.
C.2.16	The tender offer validity period is 120 days.
C.2.16.1	Add the following to the clause: "If the tender validity expires on a Saturday, Sunday or public holiday, the Tender Offer shall remain valid and open for acceptance until the closure of business on the following working day."
C.2.24	Add the following new clause: Canvassing and obtaining of additional information by Tenderers Accept that: 1. No Tenderer shall make any attempt either directly or indirectly to canvass any of the Employers officials or the Employer's agent in respect of his tender, after the opening of the tenders but prior to the Employer arriving at a decision thereon. 2. No Tenderer shall make any attempt to obtain particulars of any relevant information, other than that disclosed at the opening of tenders.
C.2.25	Add the following new clause: Prohibitions on awards to persons in service of the state Accept that the Employer is prohibited to award a tender to a person - a) Who is in the service of the state; or b) If that person is not a natural person, of which any director, manager, principal shareholder or stakeholder is a person in the service of the state; or c) A person who is an advisor or consultant contracted with the municipality or municipal entity. "In the service of the state" means to be - i) a member of: - • any municipal council. • any provincial legislature; or • the National Assembly or the National Council of Provinces; • the board of directors of any municipal entity; ii) an official of any municipality or municipal entity; iii) an employee of any national or provincial department; iv) provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999);

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	v) a member of the accounting authority of any national or provincial public entity; or vi) an employee of Parliament or a provincial legislature.” To give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in Section T2.1 must be completed.
C.2.26	Add the following new clause: Awards to close family members of persons in the service of the state “Accept that the notes to the Employer’s annual financial statements must disclose particulars of any award of more than R 2 000 to a person who is a spouse, child or parent of a person in the service of the state (defined in clause C.2.25), or has been in the service of the state in the previous twelve months, including: a) The name of that person; b) The capacity in which that person is in the service of the state; and c) The amount of the award. To give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in part T2 – Returnable Documents must be completed in full and signed.
C.2.27	Add the following new clause: Tax Compliance In the case of a Joint Venture/Consortium the tax Compliance status Pin must be submitted for each member of the Joint Venture/Consortium.”
C.2.28	Add the following new clause: • Tenderers will be notified of such missing and incomplete documents and will be offered a period of three (3) days to complete or submit those pages i.e., Municipal Bidding Documents (MBD) and other documents that require completion and signatures that do not have a bearing on functionality, specific goals and price. • Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. • In cases where locality is a specific goal and the Tenderer did not submit the required documentation, the Tenderer upon submitting the municipal statement, lease agreement or letter from ward councilor confirming business address as per above, may not be eligible for points under specific goals if such documentation was not submitted with the tender document.
C.3.2	Replace the contents of the clause with the following: If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until seven (7)

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	days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all tenderers who collected tender documents.
C.3.4.2	Tenders will be opened in public soon after closing time and recording of received documents but not later than 11:00 at the tender office located at Turbine Hall, 65 Ntemi Piliso, Newtown, 2001, Ground Floor. Tenderers' names and total prices, where practical will be, read out.

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C.3.9	Replace Existing Clause Arithmetic Errors Construction related tenders JW undertakes to check the highest scoring bid for arithmetical errors and correcting them as follows: JW shall check for arithmetic errors using the following sequence: (i) Check the amount in words against the amount in figures on the <i>Form of Offer</i>, (ii) Check the Form of Offer against the Summary Schedule Total, (iii) Check the Section Sub-Totals per section against the Summary Total for summation errors, (iv) Check the Section Sub-Totals in the Summary Schedule against Section Sub-Totals in the Bill of Quantities. (v) Check the Section Sub-Totals against the Item Totals for summation errors. (vi) Check the Item Totals against the product of the Item Rate and the Quantity Provided. If a bill of quantities or price schedule applies JW will request the bidder to correct the arithmetic errors as follows: (i) In respect of the Form of Offer, where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern. The Tenderer must be requested to adjust the amount in figures to correspond with the amount in words. JW will notify the Tenderer of all errors or omissions that are identified in the tender offer and either request the Tenderer to confirm the offer as tendered or JW will accept the corrected total of prices. Where the Tenderer elects to confirm the tender offer as tendered, correct the errors as follows: (i) 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. (ii) 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 requested to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices. Clarification session(s) shall be held with Tenderer where there are pricing discrepancies, errors are highlighted and identified corrections are explained. Tenderer is afforded an opportunity to provide clarification, accept or reject identified corrections in writing.

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	(i) In the event that the Tenderer accepts identified corrections, JW will proceed with evaluation. (ii) In the event that the Tenderer rejects the identified correction(s), JW must review the Tenderer's motivation and risks associated with the proposed change. This is not an opportunity for Tenderers to change the bid offer. A bidder that does not agree to the above will be disqualified. Risk related to the Arithmetic Corrections shall be assessed. Where risks are identified, Tenderers shall provide JW with any other material or information that has a bearing on the tender offer, the Tenderer's commercial position (including joint venture agreements), quotations preferencing arrangements or samples of materials considered necessary by JW for the purpose of a full and fair risk assessment. Should the Tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the JW request or fails to attend any meeting in which it has been formally invited to clarify any issue, the tender offer will be regarded as non-responsive.

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C.3.11	Replace Contents with Returnable Schedule MBD 6.1 for evaluation criteria. Tenderer to complete, sign and return MBD6.1 with the tender submission. Tenderer to claim the points in the space provided and submit documentary evidence to support the points claimed for specific goals. <table><tr><th>STAGE</th><th>DESCRIPTION</th></tr><tr><td>Stage 1</td><td>Mandatory Evaluation</td></tr><tr><td>Stage 2</td><td>Administrative Evaluation</td></tr><tr><td>Stage 3</td><td>Technical Evaluation</td></tr><tr><td>Stage 4</td><td>Preferential Procurement Goals and Pricing Evaluation</td></tr></table> <u>Stage 1: Mandatory Evaluation</u> <table><tr><th colspan="2">Description</th><th colspan="2">Complied</th></tr><tr><th>No</th><th>Description</th><th>Yes</th><th>No</th></tr><tr><td>1</td><td>CIBD grading 8 CE or higher (Active Status at the required CIBD grading or higher at the time of Evaluation)</td><td></td><td></td></tr><tr><td>2</td><td>Attended the compulsory briefing meeting</td><td></td><td></td></tr><tr><td>3</td><td>Form of Offer Completed and Signed</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table> Tenderers who FAIL to meet the mandatory criteria or requirements of tender will result in disqualification.	STAGE	DESCRIPTION	Stage 1	Mandatory Evaluation	Stage 2	Administrative Evaluation	Stage 3	Technical Evaluation	Stage 4	Preferential Procurement Goals and Pricing Evaluation	Description		Complied		No	Description	Yes	No	1	CIBD grading 8 CE or higher (Active Status at the required CIBD grading or higher at the time of Evaluation)			2	Attended the compulsory briefing meeting			3	Form of Offer Completed and Signed						
STAGE	DESCRIPTION																																		
Stage 1	Mandatory Evaluation																																		
Stage 2	Administrative Evaluation																																		
Stage 3	Technical Evaluation																																		
Stage 4	Preferential Procurement Goals and Pricing Evaluation																																		
Description		Complied																																	
No	Description	Yes	No																																
1	CIBD grading 8 CE or higher (Active Status at the required CIBD grading or higher at the time of Evaluation)																																		
2	Attended the compulsory briefing meeting																																		
3	Form of Offer Completed and Signed																																		

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C.1.1	<u>Stage 2: Administrative Requirements</u>				
	Description			Complied	
	Reference	Description	Requirement	Yes	No
	Certificate of Authority	Certificate of Authority or Board Resolution granting authority to sign.	Completed and signed certificate of authority to sign or signed board resolution		
	MBD 1	Invitation to Bid Form	Complete and submit complete and signed MBD 1 Form.		
	CSD	Central Supplier Database Registration	Provide proof of CSD registration.		
	MBD 4	Declaration of Interest	Complete and submit complete and signed MBD 4 Form.		
	MBD 5	Declaration of Procurement Above R10m (All Applicable Taxes Included)	Complete and submit signed MBD 5 Form.		
	T2.3.2	Acknowledgement of Project Tender Drawings	Complete and submit signed T2.3.2 Form.		
	T2.3.1	Acknowledgement of SHE Specification & Annexures	Complete and submit signed T2.3.1 Form.		
	MBD 6.1	Preference Points Claim in Terms of The Preferential Procurement Regulations 2022	Complete and submit complete and signed MBD 6.1 Form.		
	MBD 8	Declaration of Bidder's Past Supply Chain Management Practices	Complete and submit complete and signed MBD 8 Form.		
	MBD 9.	Certificate of Independent Bid Determination	Complete and submit complete and signed MBD 9 Form.		
	Annexure – Proof of Specific Goals	Valid BBBEE Certificate issued by a SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath	Submit applicable documentation with the tender submission		

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	Annexure – Proof of Specific Goals T2.2.4	Municipal statement of account for Director/s (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure)	Submit applicable documentation with the tender submission			
	Annexure – Proof of Specific Goals	Municipal statement of account for Company (not older than three [03] months from the closing date of tender or a valid lease agreement at time of tender closure).	Submit applicable documentation with the tender submission			
	Annexure – Proof of Specific Goals	3-year financial statements (audited where applicable)	Submit applicable documentation with the tender submission			
	Annexure – Proof of Specific Goals	Joint Venture Consortium or equivalent Agreement signed by all parties.	Submit applicable documentation with the tender submission			

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	<u>STAGE 2: FUNCTIONALITY REQUIREMENTS</u>					
	No.	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE	MAX SCORE	SCORE
	1	Tenderers experience with respect to the construction of Reinforced Concrete Reservoirs of 20ML capacity or more.	Supporting Documents Required include Reference Letters as per T2.1.7 (Or on Client Letter Head with all required Information) and Final Completion / Approval Certificates. <i>Note: This reference letter must be completed by the referee/previous client of the tenderer and included in the tender submission. Alternatively, the Clients letterhead may be used provided it complies with the functional requirements. A separate form must be completed for each reference as a requirement in the evaluation criteria. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	Tenderer has not completed any projects	24	0
				Tenderer has completed 1 - 2 projects		18
				Tenderer has completed more than 2 projects		24

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	No.	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
	2	Tenderers experience with respect to the construction of Steel Water Pipe Projects of diameter 450mm or more and of 500m or more of pipe length, inclusive of Cathodic Protection	Supporting documents required include reference letters as per T2.1.7 (or on client letter head with all required information) and Final Completion / Approval certificates. <i>Note: This reference letter must be completed by the referee/previous client of the tenderer and included in the tender submission. Alternatively, the Clients letterhead may be used provided it complies with the functional requirements. A separate form must be completed for each reference as a requirement in the evaluation criteria. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	Number of completed Steel Water Pipe Projects of diameter 450mm or more and of 500m or more of pipe length, inclusive of Cathodic Protection.	0 - 1 Completed Projects	12	0
					2 - 3 Completed Projects		9
					More than 3 Completed Projects		12

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	No.	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
	3	Post Qualification Experience of Contract Manager Only Contract Managers with qualifications of Bachelors' Degree (Civil Engineering / Construction Management) equivalent or higher. AND Registration (Pr. Eng. / Pr. Technologist) or PrCPM / PrCM will obtain a score for experience of a Contract Manager.	Tender must Provide CV of Contract Manager in the format given on T2.1.9 Note: Tenderers may provide their own CVs, but information provided should contain all information in T2.1.9 Note: Certified Copies of qualifications and a certified valid registration certificate to accompany the CV. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.	Number of projects involving Reinforced Concrete Reservoir construction and Bulk Water Steel Pipe Work completed as Contract Manager	0 - 2 Projects Completed 3 - 4 Projects Completed More than 4 Projects Completed	16	0 12 16

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	No.	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE	
	4	Post Qualification Experience of Construction Manager Only Construction Managers/Site Agents with qualifications of National Diploma (Civil/ Structural) Engineering or more and Registered as a Candidate Professional in the Built Environment or higher will be considered.	Tender must Provide CV of Construction Manager in the format given on T2.1.9 <i>Note: Tenderers may provide their own CVs but information provided should contain all information in T2.1.9</i> Note: Certified Copies of qualifications and a certified valid registration certificate to accompany the CV. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.	Number of projects involving Reinforced Concrete Reservoirs of 20ML or more completed as Construction Manager/Site Agent	0 Projects Completed	20	0	
					1 - 2 Projects Completed		10	
					3 – 4 Projects Completed		15	
					More than 4 Projects Completed		20	
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	No.	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
	5	Post Qualification Experience of Safety Officer Only Safety Officers with qualifications of National Diploma (Safety Management)/ (Environmental Health/Science/ Management), SAMTRAC/ SHEOMTRAC/ SHEMA/ MESHTRAC /NEBOSH/Safety Officers Course (NQF5) or more, AND Registered with SACPCMP in the "Construction Health and Safety" Sector will be considered. However, the time of registration of Safety Officer will not impact post qualification number of projects.	Tender must Provide CV of Safety Officer in the format given on T2.1.9 All Civil Related projects will be considered Note: <i>Certified Copies of qualifications and a certified valid registration certificate to accompany the CV. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	Number of civil/structural engineering projects completed as Safety Officer	0 Completed Projects	12	0
					1 - 2 Completed Projects		6
					3 - 4 Completed Projects		9
					More than 4 Completed Projects		12

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	No.	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAXSCORE	CRITERIA
6		Site Specific Method Statement (Reference to be made to PS.1 under Scope of Works)	Tenderer must provide Site Specific Method Statement as per template given in Section T2 Returnable Documents T2.1.10, which addresses the following key sections: 1. Approach statement and Introduction which illustrates understanding of the scope. 2. Quality Control Plan including all necessary standards to be used, resources available and procedures to ensure quality. 3. Safety Control with respect to working at heights and confined spaces. 4. Project Programme/schedule (On MS Projects or any other Gantt chart as Annexure)	All four of the required sections are covered by the Method Statement in line with the guidelines and are specific to Woodmead Reservoir and Associated Pipelines	Method Statement not submitted	16	0
					1-2 of the required sections are covered by the Method Statement in line with the guidelines and are specific to Woodmead Reservoir and Associated Pipelines		8
					Atleast three of the required sections are covered by the Method Statement in line with the guidelines and are specific to Woodmead Reservoir and Associated Pipelines		12
					All four of the required sections are Covered by the Method Statement in line with the guidelines and are specific to Woodmead Reservoir and Associated Pipelines.		16

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			outlining critical path, aligned to the scope of works, aligned to the contractual timelines, and including all contractual dates. The compilation of sections 1 to 4 of the Site Specific Method Statement must be inclusive of the following components: •Construction of 20ML Reservoir. •Construction of chambers in the reservoir complex; •Installation of all associated pipework, including inlet, outlet and bypass, solar system, and telemetry.				
	MINIMUM QUALIFYING SCORE					75	
	TOTAL					100	

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	NOTE 1: Where applicable, foreign qualifications MUST be accompanied by a SAQA verification certificate. Failure to submit SAQA verification certificate will lead to that qualification not being considered for allocation of points for that criterion. NOTE 2: When an uncertified copy of professional registration is submitted and the requirement was to submit a certified copy, JW will verify the validity of the registration on the issuing bodies or institution's website. If the verification is confirmed on the website, the bidder meets the criteria. This will only be applicable for the recommended bidders. NOTE 3: The time of registration of Contract Manager, Site Manager and Safety Officer will not impact post qualification number of projects. NOTE 4: The information provided by bidders will be verified and if found to be false, punitive measures will be affected. ECSA: Engineering Council of South Africa SACPCMP: South African Council for the Project and Construction Management Professions SAMTRAC: Safety Management Training Course NEBOSH: National Examination Board in Occupational Safety and Health SHEOMTRAC: Safety Health Environmental Occupational Management Training Course SHEMTRAC: Safety Health Environmental Management Training Course MESHTRAC: Management Environmental Safety Health Training Course

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	4. STAGE FOR PRICE AND PREFERENCE POINTS EVALUATION: 4.1. Pricing The following aspects will be considered in the financial offer: - Costing for all items as described in the Pricing Schedule and applicable Strategies Review of financial offer and discrepancies between total and calculations. - Identify any parameters that may have a bearing on the financial offer, e.g., contract period, price escalations or adjustments required and life cycle costs. - The 90/10 preference point system will be applicable in this tender. Whereby 90 points will be allocated to price and 10 points will be allocated to the set specific goals per category as outlined on the pricing schedule. The bidder scoring the highest in terms of price and specific goal will be recommended for that specific category. 4.2. Award and Allocation Strategy: <table><tr><td>AWARD STRATEGY</td><td>The tender will be awarded to the highest scoring bidder in terms of price and Specific Goals</td></tr><tr><td>ALLOCATION STRATEGY</td><td>The tender will be allocated to the highest scoring bidder in terms of price and Specific Goals</td></tr></table> 4.3. The maximum preference points for this bid are allocated as follows: <table><tr><th></th><th>POINTS</th></tr><tr><td>PRICE</td><td>90</td></tr><tr><td>SPECIFIC GOALS</td><td>10</td></tr><tr><td>Total points for Price and SPECIFIC GOALS</td><td>100</td></tr></table> SPECIFIC GOALS	AWARD STRATEGY	The tender will be awarded to the highest scoring bidder in terms of price and Specific Goals	ALLOCATION STRATEGY	The tender will be allocated to the highest scoring bidder in terms of price and Specific Goals		POINTS	PRICE	90	SPECIFIC GOALS	10	Total points for Price and SPECIFIC GOALS	100
AWARD STRATEGY	The tender will be awarded to the highest scoring bidder in terms of price and Specific Goals												
ALLOCATION STRATEGY	The tender will be allocated to the highest scoring bidder in terms of price and Specific Goals												
	POINTS												
PRICE	90												
SPECIFIC GOALS	10												
Total points for Price and SPECIFIC GOALS	100												

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	In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations 2022, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender. Specific goals may include contracting with persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of race, gender or disability. Race: I. Ownership by black people II. Black Designated Group: - Ownership by black people that are unemployed - Ownership by black people who are youth - Ownership by black people living in rural or underdeveloped areas or townships - Ownership by black people with disabilities - Ownership by black people who are military veterans - Cooperative owned by black people Gender: III. Persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of gender are women. Ownership by persons that are classified as female or women according to the Department of Home Affairs of South African. Disability: IV. Persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of disability are disabled persons. Reconstruction and Development Programme (RDP) objectives as published in Government Gazette No. 16085 dated 23 November 1994 i.e., Local Manufacture: I. Promotion of procurement of locally manufactured goods in South Africa to promote job creation in light of the high unemployment rate in South Africa which has a greater impact previously disadvantaged individuals and black youth. Locality: I. Promotion of procurement from local business in the geographical areas that JW operate in. This is also directed at creating employment in the areas JW operate in. The BSC may allocate points as follows: • Promotion of enterprises located in the Gauteng Province • Promotion of enterprises located in a specific region within COJ (the 7 regions. A to G) • Promotion of enterprises located in the City of Johannesburg municipality • Promotion of enterprises located rural or underdeveloped areas or townships. QSE

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Clause Number	Tender Data								
	I. Promotion of procurement from QSE's that are black owned. EME: I. Promotion of procurement from EME's that are black own. SUB-CONTRACTING: Promotion of a company previously owned by a Historically Disadvantaged Individuals (HDI). Consider sub-contract only in cases where there are no company which can meet any of the specific goals. Check if the portion of the work cannot be subcontracted in terms of specific goals. One goal may be chosen, or a combination of goals may be decided upon including a sub-goal i.e., owned by black people that are disabled etc., JOINT VENTURE, CONSORTIUM OR EQUIVALENT: For Joint Venture Agreements, Consortiums or equivalent, the agreement must show percentages of ownership and work to be completed by each party. This agreement must form part of the tender submission. To determine the Joint Venture, Consortium or equivalent score for specific goals, JW will look at the consolidated BBBEE certificate to determine the points for specific goals that will be awarded to the tenderer. If a consolidated BBBEE certificate is not submitted, the parties to the joint venture, consortium or equivalent must submit their individual BBBEE certificates issued by a SANAS accredited verification agency or the documents listed below on 4.6 and the joint venture, consortium or equivalent agreement in order for JW to determine the proportional points for specific goals. Documentation to be provided: • JV, Consortium, or equivalent agreement • Consolidated BBBEE certificate issued by an SANAS accredited verification agency. Certificate must be valid Table 1: <table border="1"> <thead> <tr> <th>The specific goals allocated points in terms of this tender</th><th>Number of points allocated (90/10 system)</th></tr> </thead> <tbody> <tr> <td>Business located within the boundaries of COJ Municipality</td><td>6</td></tr> <tr> <td>Business owned by 51% or more-Youth</td><td>4</td></tr> <tr> <td>Total</td><td>10</td></tr> </tbody> </table> 4.4. The following verification documents must be submitted with the tender document:	The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)	Business located within the boundaries of COJ Municipality	6	Business owned by 51% or more-Youth	4	Total	10
The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)								
Business located within the boundaries of COJ Municipality	6								
Business owned by 51% or more-Youth	4								
Total	10								

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14289R

**CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section T1 Tendering Procedures**



Clause Number	Tender Data																															
	SPECIFIC GOALS – ANY ONE OR A COMBINATION OF ANY	MEANS OF VERIFICATION THAT MAY BE SELECTED OR A COMBINATION THEREOF																														
	Business located within the boundaries of COJ Municipality	• Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address.																														
	Business owned by 51% or more-Youth	Valid BBBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR • CIPC registration document showing percentage of ownership and share certificate where applicable																														
	Joint Venture (JV), Consortium or Equivalent	• JV, Consortium or Equivalent agreement which must indicate percentage ownership/interest of each party, and • Certified copy a valid consolidated BBBEE certificate issued by SANAS accredited verification agency, and CIPC registration document (if sub-contracting to a 51% or more blacked owned Cooperative).																														
4.5. The following are the requirements for the Sworn Affidavit it terms of the BBBEE Sector Codes of Good Practise:																																
<table border="1"> <thead> <tr> <th>Affidavit Prescribed Formats</th><th>Category</th><th>Financial Threshold</th></tr> </thead> <tbody> <tr> <td colspan="3">Generic Enterprises</td></tr> <tr> <td></td><td>BO QSE</td><td>Between R10m and R50m</td></tr> <tr> <td></td><td>BO EME</td><td>Less than R10m</td></tr> <tr> <td colspan="3">Sector Specific Enterprises</td></tr> <tr> <td></td><td>BO QSE</td><td>Between R10m and R50m</td></tr> <tr> <td></td><td>BO EME</td><td>Less than R10m</td></tr> <tr> <td colspan="3">Construction Sector Code</td></tr> <tr> <td></td><td>EME Contractor</td><td>Less than R3m</td></tr> <tr> <td></td><td>BO EME BEP</td><td>Less than R1.8m</td></tr> </tbody> </table>			Affidavit Prescribed Formats	Category	Financial Threshold	Generic Enterprises				BO QSE	Between R10m and R50m		BO EME	Less than R10m	Sector Specific Enterprises				BO QSE	Between R10m and R50m		BO EME	Less than R10m	Construction Sector Code				EME Contractor	Less than R3m		BO EME BEP	Less than R1.8m
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	BO EME BEP	Less than R1.8m																														

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section T1 Tendering Procedures



Clause Number	Tender Data	
	Financial Sector Code	
		BO QSE Between R10m and R50m
		BO EME Less than R10m
	Information Communication Technology Sector Code (ICT)	
		BO QSE Between R10m and R50m
		BO EME Less than R10m
	Marketing, Advertising & Communication Sector Code (MAC)	
	> Public Relations	BO QSE Between R5m and R10m
	> Marketing, Advertising & Communications	BO EME Less than R5m
	Property Sector Code	
	> Service-based	BO QSE Between R5m and R10m
		EME Less than R5m
	> Agency-based	BO QSE Between R2.5m and R35m
	> Asset-based	EME Less than R2.5m
		BO QSE Between R80m and R400m
	Tourism Sector Code	
		BO QSE Between R5m and R45m
		BO EME Less than R5m
	Specialised Enterprises	
		BO QSE Between R10m and R50m
		BO EME Less than R10m
4.6. Requirements for a valid BBBEE Certificate - Copy of a certified valid BBBEE certificate (Only Valid BBBEE certificate must be accredited by SANAS) or valid Sworn Affidavit issued by the DTIC or the CIPC or in a similar format complying with commissioner of oath Act. - Bidders who do NOT qualify as EME's and QSE's as outlined in 5.5, must submit B-BBEE verification certificates that are issued by an Agency accredited by SANAS. - Bidders who fail to submit a certified copy of their valid B-BBEE certificate or valid sworn affidavit or valid DTI / CIPC B-BBEE certificate will score zero points for specific goals. Valid Sworn Affidavits or certified copies of B-BBEE Certificate must comply with the requirements outlined in the Justices of the Peace and Commissioners of Oaths Act, no 16 of		

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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Clause Number	Tender Data
	1963 and its Regulations promulgated in Government Notice GNR 1258 of 21 July 1972 Justices of the Peace and Commissioners of Oaths Act, No. 16 of 1963. i.e. (i) The deponent shall sign the declaration in the presence of the commissioner of oaths (COA). (ii) Below the deponent's signature the COA shall certify that the deponent has acknowledged that he knows and understands the contents of the declaration and the COA shall state the manner, place, and date of taking the declaration. (iii) The COA shall sign the declaration and print his full name and business address below his signature; and state his designation and the area for which he holds his appointment, or the office held by him if he holds his appointment ex officio. (iv) Copy of certified copies will not be accepted. N.B. A tenderer failing to submit proof of specific goals claimed as per 5.2 to 5.6 will not be disqualified but will be allocated zero points for specific goals and will be allocated points for pricing. ADJUDICATION USING A POINT SYSTEM (a) The bidder obtaining the highest number of total points will be awarded the contract. (b) 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; (c) Points scored must be rounded off to the nearest 2 decimal places. (d) 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 points for specific goals. (e) However, when functionality is part of the evaluation process and two or more bids have scored equal points including equal preference points for specific goals, the successful bid must be the one scoring the highest score for functionality. (f) Should two or more bids be equal in all respects, the award shall be decided by the drawing of lots. POINTS AWARDED FOR PRICE THE 90/10 PREFERENCE POINT SYSTEMS A maximum of 90 points is allocated for price on the following basis: 90/10 $P_s = 90 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$ Where P_s = Points scored for comparative price of bid under consideration P_t = Comparative price of bid under consideration

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14289R

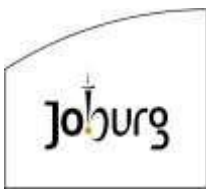
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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Clause Number	Tender Data
	Pmin = Comparative price of lowest acceptable bid
	Add to the existing clause: Tender offers will only be accepted if: a) the tenderer submits a valid SARS tax Compliance status Pin for tenders issued by the South African Revenue Services or has made arrangements to meet outstanding tax obligations. b) Proof of CSD registration ie MA xxxxx number. c) the tenderer submits a letter of intent from an approved insurer undertaking to provide the Performance Guarantee to the format included in Part T2.2.22 of this procurement document d) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation. e) the tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector. f) 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. g) the tenderer has completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state are permitted to submit tenders or participate in the contract. h) the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer. i) 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; and j) the tenderer: i) has sufficiently substantiated his experience in this type work; ii) has the required and experienced key personnel; and iii) Owns the primary equipment to effectively and efficiently execute the work.
C.3.17	The number of paper copies of the signed contract to be provided by the Employer is one.
	There are no additional conditions of tender.

--- END OF PART ---

Employer:		Contractor:	
Witness:		Witness:	



Johannesburg Water (SOC) Ltd



CONTRACT NO. JW14289R

**CONSTRUCTION OF 22 ML REINFORCED
CONCRETE WOODMEAD RESERVOIR**

VOLUME 1

RETURNABLE DOCUMENTS AND SCHEDULES

Employer:		Contractor:	
Witness:		Witness:	



T2.1 LIST OF RETURNABLE DOCUMENTS

The tenderer must complete the following returnable documents:

<u>Document</u>	<u>Page</u>
1. Returnable Schedules required for tender evaluation purposes	
T2.1.1 Record of addenda to tender documents	RD.4
T2.1.2 Certificate of Authority	RD.5
T2.1.3 Compulsory Enterprise Questionnaire	RD.10
T2.1.4 Preferential Procurement	RD.12
MBD 6.1 Preference points claim form in terms of the preferential procurement regulations	RD.12
MBD 4 Declaration of any potential conflict of interest	RD.19
MBD 8 Declaration of bidder's past Supply Chain management practices	RD.21
MBD 5 Declaration for Procurement above R10 Million (VAT Included)	RD.23
Certificate of independent bid determination	RD.25
MBD 9	
T2.1.5 Proposed qualifications	RD.28
T2.1.6 Schedule of the Tenderer's experience	RD.29
T2.1.7 Contactable reference template	RD.30
T2.1.8 Schedule of key personnel	RD.43
T2.1.9 Curriculum vitae of key personnel	RD.45
T2.1.10 Site Specific Method Statement	RD.54

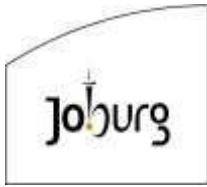
T2.2 LIST OF ADDITIONAL RETURNABLE DOCUMENTS

<u>Document</u>	<u>Page</u>
2. Other documents required only for tender evaluation purposes	
T2.2.1 Certificate of Contractor Registration issued by the Construction Industry Development Board	RD.60
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA number	RD.61

T2.3 LIST OF RETURNABLE SCHEDULES

<u>Document</u>	<u>Page</u>
3. Other documents that will be incorporated into the contract	
T2.3.1 JW 6.4 Returnable Annexure A – SHE Acknowledgment Form	RD.62
T2.3.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings	RD.63
T2.3.3 Mandatory tender briefing meeting	RD.

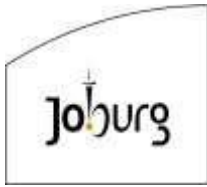
NOTE: The Tenderer is required to complete each and every schedule listed above to the best of his ability as the evaluation of tenders and the eventual contract will be based on the information provided by the tenderer.



T2.1 LIST OF RETURNABLE DOCUMENTS

<u>Document</u>	<u>Page</u>
1. Returnable Schedules required only for tender evaluation purposes	
T2.1.1 Record of addenda to tender documents	RD.4
T2.1.2 Certificate of authority	RD.5
T2.1.3 Compulsory Enterprise Questionnaire	RD.10
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T2.1.9 Curriculum vitae of key personnel	RD.45

Employer:		Contractor:	
Witness:		Witness:	



Contract JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section T2 Returnable Documents



T2.1.1 Record of Addenda to Tender Documents

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

	Date	Title or Details
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

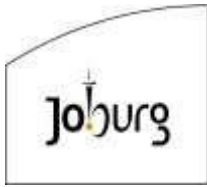
Attach additional pages if more space is required.

Signed _____ Date _____

Name _____ Position _____

Tenderer _____

Employer:		Contractor:	
Witness:		Witness:	



T2.1.2 Certificate of Authority

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

(I) COMPANY	(II) CLOSE CORPO- RATION	(III) PARTNERSHIP	(IV) JOINT VENTURE	(V) SOLE PROPRIE- TOR

i. Certificate For Company

I, ..., chairperson of the Board of Directors of, hereby confirm that by resolution of the Board (copy attached) taken on, Mr/Ms, acting in the capacity of, was authorized to sign all documents in connection with the tender for Contract No. JW14289R and any contract resulting from it on behalf of the company.

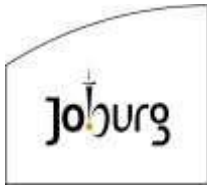
Chairman:

As Witnesses: 1.....

2.....

Date:

Employer:		Contractor:	
Witness:		Witness:	



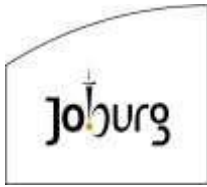
ii. Certificate For Close Corporation

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

NAME	ADDRESS	SIGNATURE	DATE

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

Employer:		Contractor:	
Witness:		Witness:	



iii. Certificate For Partnership

We, the undersigned, being the key partners in the business trading as,

....., hereby authorize Mr/Ms,

acting in the capacity of....., to sign all documents in connection

with the tender and any contract resulting from it on our behalf.

NAME	ADDRESS	SIGNATURE	DATE

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

Employer:		Contractor:	
Witness:		Witness:	



Contract JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section T2 Returnable Documents



iv. Certificate For Joint Venture

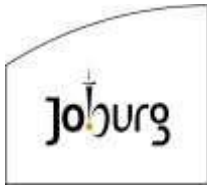
This Returnable Schedule is to be completed by joint ventures.

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

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

Note : This certificate is to be completed and signed by all of the key partners upon whom rests the direction of the affairs of the Joint Venture as a whole.

Employer:		Contractor:	
Witness:		Witness:	



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CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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v. Certificate *For Sole Proprietor*

I, ..., hereby confirm that I am the sole owner of the Business
trading as

Signature of Sole owner:

As Witnesses:

1.....

2.

Date:

Employer:		Contractor:	
Witness:		Witness:	



Contract JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
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T2.1.3 Compulsory Enterprise Questionnaire

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

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: CIDB registration number, if any:

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

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

Section 5: Particulars of companies and close corporations

Company registration number

Close corporation number

Proof of CSD registration ie MA xxxxxxxxx number

SARS Tax Compliance status Pin number

Section 6: Record in the service of the state

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

☐ a member of any municipal council	☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
☐ a member of any provincial legislature	
☐ a member of the National Assembly or the National Council of Province	☐ a member of an accounting authority of any national or provincial public entity
☐ a member of the board of directors of any municipal entity	☐ an employee of Parliament or a provincial legislature
☐ an official of any municipality or municipal entity	

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

Name of sole proprietor, partner, director, manager, principal shareholder or stakeholder	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months

*insert separate page if necessary



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CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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Section 7: Record of spouses, children and parents in the service of the state

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

☐ a member of any municipal council	☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
☐ a member of any provincial legislature	☐ a member of an accounting authority of any national or provincial public entity
☐ a member of the National Assembly or the National Council of Province	☐ an employee of Parliament or a provincial legislature
☐ a member of the board of directors of any municipal entity	
☐ an official of any municipality or municipal entity	

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

*insert separate page if necessary

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

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

Signed

Date

Name

Position

Enterprise name



T2.1.4 Preferential Procurement

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

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

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

1. GENERAL CONDITIONS

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

- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 The applicable preference point system for this tender is the 90/10 preference point system.

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

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

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	90
SPECIFIC GOALS	10
Total points for Price and SPECIFIC GOALS	100

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

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

2. DEFINITIONS

- a) **“tender”** means a written offer in the form determined by an organ of state in



- response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
- b) **“price”** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts.
 - c) **“rand value”** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
 - d) **“tender for income-generating contracts”** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
 - e) **“the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1 POINTS AWARDED FOR PRICE

a) THE 90/10 PREFERENCE POINT SYSTEMS

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

90/10

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

Where

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

4. POINTS AWARDED FOR SPECIFIC GOALS

- #### 4.1
- In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in Table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:



Table 1: Specific goals for the tender and points claimed are indicated per the table below.

Note to tenderers: The tenderer must indicate how they claim points for each preference point system.)

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)	Number of points claimed (90/10 system) (To be completed by the tenderer)
Business owned by 51% or more-Youth	6	
Businesses located within the boundaries of COJ municipality	4	
Total	10	

5. DECLARATION WITH REGARD TO COMPANY/FIRM

5.1 Name of company/firm.....

5.2 Company registration number:

5.3 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
☐ One-person business/sole propriety
☐ Close corporation
☐ Public Company
☐ Personal Liability Company
☐ (Pty) Limited
☐ Non-Profit Company
☐ State Owned Company
[TICK APPLICABLE BOX]

5.4 I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

- The information furnished is true and correct;
- The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
- If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –



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- (a) disqualify the person from the tendering process;
- (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
- (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
- (d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
- (e) forward the matter for criminal prosecution, if deemed necessary.

SIGNATURE(S) OF TENDERER

SURNAME AND NAME:

DATE:

ADDRESS:
.....
.....



5.5 SUB-CONTRACTING

5.5.1 Will any portion of the contract be sub-contracted?

(Tick applicable box)

YES	☐	NO	☐

5.5.2 If yes, indicate:

- i) What percentage of the contract will be subcontracted _____ (minimum of 30%)
ii) The name of the sub-contractor(s):

iii) The black shareholders of the sub-contractor(s):

iv) Whether the sub-contractor(s) is an EME or QSE

(Tick applicable box)

YES	☐	NO	☐

v) Specify, by ticking the appropriate box, if subcontracting with an enterprise in terms of Preferential Procurement Regulations, 2022:

Designated Group: An EME or QSE which is at least 51% owned by:	EME √	QSE √
Black people		
Black people who are youth		
People who are women		
Black people with disabilities		
Black people living in rural or underdeveloped areas or townships		
Cooperative owned by black people		
Black people who are military veterans		
OR		
Any EME		
Any QSE		



5.6 DECLARATION WITH REGARD TO COMPANY/FIRM

5.6.1 Name of company/firm:

5.6.2 VAT number registration number:

5.6.3 Company registration number:

5.7 TYPE OF COMPANY/ FIRM

☐ Partnership/Joint Venture / Consortium

☐ One person business/sole propriety

☐ Close corporation

☐ Company

☐ (Pty) Limited

[TICK APPLICABLE BOX]

5.8 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

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

5.9 COMPANY CLASSIFICATION

☐ Manufacturer

☐ Supplier

☐ Professional service provider

☐ Other service providers, e.g. transporter, etc.

[TICK APPLICABLE BOX]

5.10 MUNICIPAL INFORMATION

Municipality where business is situated:

Registered Account Number:

Stand Number:

5.11 Total number of years the company/firm has been in business:.....

5.12 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the Specific Goals in MBD 6.1 qualifies the company/ firm for the preference(s) shown and I / we acknowledge that:

v) The information furnished is true and correct;

vi) In the event of a contract being awarded as a result of points claimed as shown in MBD 6.1, the contractor is required to furnish documentary proof as requested in the Tender Data to the satisfaction of the purchaser that the claims are correct;



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- vii) If the specific goals points have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –
- (a) Disqualify the person from the bidding process;
 - (b) Recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
 - (c) Cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
 - (d) Recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
 - (e) Forward the matter for criminal prosecution.

WITNESSES

1.
2.

.....
SIGNATURE(S) OF BIDDERS(S)

DATE:

ADDRESS

.....

.....



MBD 4

DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state¹.
2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.
3. **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

- 3.1 Full Name of bidder or his or her representative:.....
- 3.2 Identity Number:.....
- 3.3 Position occupied in the Company (director, trustee, shareholder²):.....
- 3.4 Company Registration Number:
- 3.5 Tax Reference Number:.....
- 3.6 VAT Registration Number:
- 3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.
- 3.8 Are you presently in the service of the state? **YES / NO**
 - 3.8.1 If yes, furnish particulars.

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

- (a) a member of –
 - (i) any municipal council;
 - (ii) any provincial legislature; or
 - (iii) the national Assembly or the national Council of provinces;
- (b) a member of the board of directors of any municipal entity;
- (c) an official of any municipality or municipal entity;
- (d) an employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999);
- (e) a member of the accounting authority of any national or provincial public entity; or
- (f) an employee of Parliament or a provincial legislature.

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

- 3.9 Have you been in the service of the state for the past twelve months? YES / NO
 - 3.9.1 If yes, furnish particulars.....
- 3.10 Do you have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid?
..... YES / NO
 - 3.10.1 If yes, furnish particulars.....



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

3.11.1 If yes, furnish particulars.....
.....

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

3.12.1 If yes, furnish particulars.....
.....

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

3.13.1 If yes, furnish particulars.....
.....

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

3.14.1 If yes, furnish particulars:.....
.....

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

Full Name	Identity Number	State Employee Number

.....
Signature

.....
Date

.....
Capacity

.....
Name of Bidder



MBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

- 1 The bid of any bidder may be disregarded if that bidder, or any of its directors have-
 - a. abused the institution's supply chain management system;
 - b. committed fraud or any other improper conduct in relation to such system; or
 - c. failed to perform on any previous contract.

- 2 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's data-base 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 National Treasury after the <i>audi alteram partem</i> rule was applied).	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? To access this Register, enter the National Treasury's website, www.treasury.gov.za, click on the icon "Register for Tender Defaulters" or submit your written request for a hard copy of the Register to facsimile number (012) 3265445.	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		



CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)

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

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

.....

Signature

.....

Date

.....

Position

.....

Name of Bidder



MBD 5

DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)

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

- 1** Are you by law required to prepare annual financial statements for auditing? **YES / NO**
 - 1.1 If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.....
.....
- 2** If the bidder is not required by law to prepare annual financial statements for auditing, they shall be required to furnish their Annual Financial Statements -
 - i. for the past three years , or
 - ii. since their establishment if established during the past three years
 - 2.1 Do you have any outstanding undisputed commitments for municipal services towards a municipality or any other service provider in respect of which payment is overdue for more than 30 days?
YES / NO
 - 2.2 If no, this serves to certify that the bidder has no undisputed commitments for municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days.
 - 2.3 If yes, provide particulars.....
.....
- 3** Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract? **YES / NO**
 - 3.1 If yes, furnish particulars.....
.....
- 4** Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic? **YES / NO**
 - 4.1 If yes, furnish particulars.....
.....



CERTIFICATION

I, THE UNDERSIGNED (NAME)

.....

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

**I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION
PROVE TO BE FALSE.**

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder



MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1. This Municipal Bidding Document (MBD) must form part of all bids¹ invited.
2. Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging)². Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.
3. Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:
 - a. take all reasonable steps to prevent such abuse;
 - b. reject the bid of any bidder if that bidder or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and
 - c. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the bidding process or the execution of the contract.
4. 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. In order to give effect to the above, the attached Certificate of Bid Determination (MBD9) must be completed and submitted with the bid:

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

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



MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

(Bid Number and Description) in response to the invitation for the bid made by:

(Name of Municipality / Municipal Entity) do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of

_____ that:

(Name of Bidder)

1. I have read, and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
 - (a) has been requested to submit a bid in response to this bid invitation;
 - (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
 - (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder
6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium³ 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;

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



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-
- (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; or
(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.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder



T2.1.5 Proposed Amendments and Qualifications

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

The Tenderer's attention is drawn to clause C.3.8 of the Standard Conditions of Tender referenced in the Tender Data regarding the employer's handling of material qualifications.

Page	Clause or item	Proposal

Signed..... Date

Name..... Position

Tenderer



T2.1.6 Schedule of the Tenderer's Experience

EMPLOYER: CONTACT PERSON AND TELEPHONE NUMBER	EMPLOYER'S AGENT OR REPRESENTATIVE: CONTACT PERSON AND TELEPHONE NUMBER	NATURE OF WORK	VALUE OF WORK (inclusive of VAT)	DATE COMPLETED OR EXPECTED TO BE COMPLETED

Signed..... Date

Name..... Position

Tenderer



T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

CRITERIA 1

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW14289R** for the **Construction of 22 ML Reinforced Concrete Woodmead Reservoir**

Name of Tenderer:

Description of Services provided

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

Method of construction.....

Reservoir size.....

Project Value.....

Material type.....

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

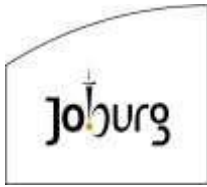
.....

Email:

Completed on behalf (Name of Client)

.....

NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

CRITERIA 1

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Name of Tenderer:

Description of Services provided

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

Method of construction.....

Reservoir size.....

Project Value.....

Material type.....

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

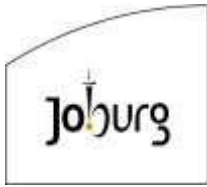
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Email:

Completed on behalf (Name of Client)

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NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



T 2.1.7 CONTACTABLE REFERENCE

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CRITERIA 1

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Name of Tenderer:

Description of Services provided

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

Method of construction.....

Reservoir size.....

Project Value.....

Material type.....

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

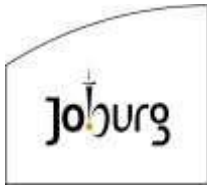
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Completed on behalf (Name of Client)

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T 2.1.7 CONTACTABLE REFERENCE

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Name of Tenderer:

Description of Services provided

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Method of construction.....

Reservoir size.....

Project Value.....

Material type.....

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

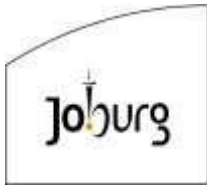
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Email:

Completed on behalf (Name of Client)

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NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

CRITERIA 1

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW14289R** for the **Construction of 22 Ml Reinforced Concrete Woodmead Reservoir**.

Name of Tenderer:

Description of Services provided

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

Method of construction.....

Reservoir size.....

Project Value.....

Material type.....

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

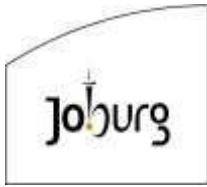
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Email:

Completed on behalf (Name of Client)

.....

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Name of Tenderer:

Description of Services provided

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.....
.....

Method of construction.....

Reservoir size.....

Project Value.....

Material type.....

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

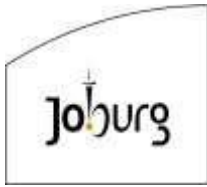
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.....

NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

CRITERIA 2

I, the undersigned being duly authorized to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW14289R** for the **Construction of 22 Ml Reinforced Concrete Woodmead Reservoir**.

Name of Tenderer:

Description of Services provided

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

Method of construction.....

Pipe diameter size.....

Material type.....

Pipeline Length (m).....Cathodic Protection (Yes/No).....

Contract Value (Excl. VAT)

Name of authorized person:

Signature :..... Date

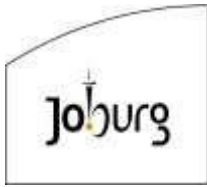
Telephone/Mobile:

Email:

Completed on behalf (Name of Client)

.....

NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

CRITERIA 2

I, the undersigned being duly authorized to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW14289R** for the **Construction of 22 Ml Reinforced Concrete Woodmead Reservoir**.

Name of Tenderer:

Description of Services provided

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

Method of construction.....

Pipe diameter size.....

Material type.....

Pipeline Length (m).....Cathodic Protection (Yes/No).....

Contract Value (Excl. VAT).....

Name of authorized person:

Signature :.....Date

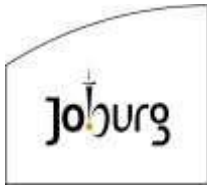
Telephone/Mobile:

Email:

Completed on behalf (Name of Client)

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NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



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To Johannesburg Water (SOC) Ltd

CRITERIA 2

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Name of Tenderer:

Description of Services provided

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

Method of construction.....

Pipe diameter size.....

Material type.....

Pipeline Length (m).....Cathodic Protection (Yes/No).....

Contract Value (Excl. VAT).....

Name of authorized person:

Signature :.....Date

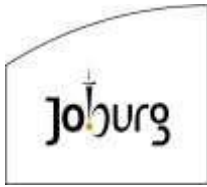
Telephone/Mobile:

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Completed on behalf (Name of Client)

.....

NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.



T 2.1.7 CONTACTABLE REFERENCE

To Johannesburg Water (SOC) Ltd

CRITERIA 2

I, the undersigned being duly authorized to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW14289R** for the **Construction of 22 MI Reinforced Concrete Woodmead Reservoir**.

Name of Tenderer:

Description of Services provided

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

Method of construction.....

Pipe diameter size.....

Material type.....

Pipeline Length (m).....Cathodic Protection (Yes/No).....

Contract Value (Excl. VAT).....

Name of authorized person:

Signature :.....Date

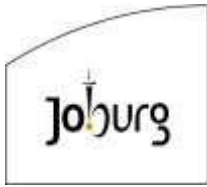
Telephone/Mobile:

Email:

Completed on behalf (Name of Client)

.....

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Name of Tenderer:

Description of Services provided

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

Method of construction.....

Pipe diameter size.....

Material type.....

Pipeline Length (m).....Cathodic Protection (Yes/No).....

Contract Value (Excl. VAT).....

Name of authorized person:

Signature :.....Date

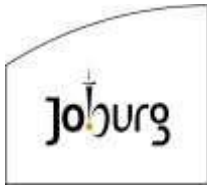
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Name of Tenderer:

Description of Services provided

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

Method of construction.....

Pipe diameter size.....

Material type.....

Pipeline Length (m).....Cathodic Protection (Yes/No).....

Contract Value (Excl. VAT)

Name of authorized person:

Signature :..... Date

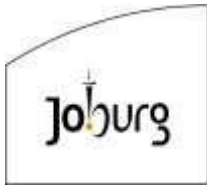
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Description of Services provided

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

Method of construction.....

Pipe diameter size.....

Material type.....

Pipeline Length (m).....Cathodic Protection (Yes/No).....

Contract Value (Excl. VAT)

Name of authorized person:

Signature :.....Date

Telephone/Mobile:

Email:

Completed on behalf (Name of Client)

.....

NB: This document must be completed by the Client and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.

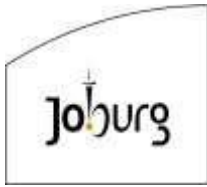


T2.1.8: Schedule of Key Personnel

In terms of the Project Specification and the Conditions of Tender, unskilled workers may only be brought in from outside the local community if such personnel are not available locally.

The Tenderer shall list below the personnel which they intend to utilize on the Works, including key personnel which may have to be brought in from outside if not available locally.

CATEGORY OF EMPLOYEE	NUMBER OF PERSONS					
	KEY PERSONNEL, PART OF THE TENDERER'S ORGANISATION		KEY PERSONNEL TO BE IMPORTED IF NOT AVAILABLE LOCALLY		UNSKILLED PERSONNEL TO BE RECRUITED FROM LOCAL COMMUNITY	
	HDI	NON-HDI	HDI	NON-HDI	HDI	NON-HDI
Contracts Manager						
Site Manager/Agent						
Safety Officer						
Quality Control						
Surveyors						
Technicians						
Foremen						
Artisans and other Skilled workers						
Plant Operators						



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CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
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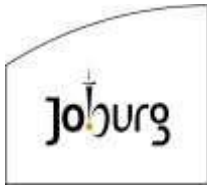


Unskilled Workers						
Others:						

SIGNATURE:.....

DATE:

(of person authorized to sign on behalf of the Tenderer)



Contract JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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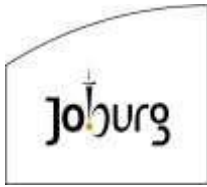


Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and Duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	



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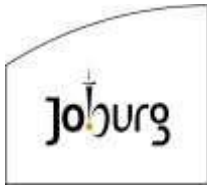


Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

I, ... , hereby declare that I am aware of the inclusion of my Curriculum Vita in the proposed project team and confirm that I will be available for this project.

Signature :

Date :



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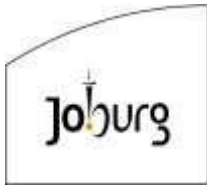
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and Duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	



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Description of Scope and duties	

I, ... , hereby declare that I am aware of the inclusion of my Curriculum Vita in the proposed project team and confirm that I will be available for this project.

Signature :

Date :

Provide separate forms for each position listed in Key Personnel Forms:

Proposed role in the project	SAFETY OFFICER

1. Surname	
2. First Name	
3. Date and place of birth	
4. Nationality	
5. Membership of Professional Bodies and Professional Registration	

6. Education

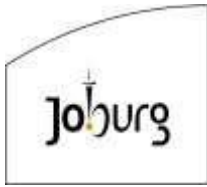
Institution (Date from – Date to)	Degree(s) or Diploma(s) obtained

7. Postgraduate / Diploma Experience

Company / Organisation	(Date from – Date to)	Years of Employment	Position

8. Key Experience Relevant to Project

[illegible]



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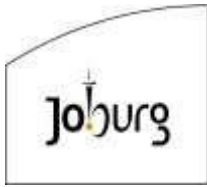
Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and Duties	

Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
Description of Scope and duties	

Project Name and Locality	
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Project Name and Locality	
Project Dates and Value	
Project Position (e.g. Project Manager, Engineer, etc.)	
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Project Name and Locality	
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Project Position (e.g. Project Manager, Engineer, etc.)	



Contract JW14289R
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Description of Scope and duties	

I, ... , hereby declare that I am aware of the inclusion of my Curriculum Vita in the proposed project team and confirm that I will be available for this project.

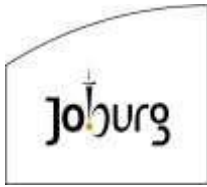
Signature :

Date :

T2.1.10 Site Specific Method Statement

THE SITE-SPECIFIC METHOD STATEMENT MUST BE COMPLETED IN THE TEMPLATE LISTED BELOW. METHOD STATEMENTS THAT ARE PROVIDED IN ANY OTHER FORMAT WILL NOT BE CONSIDERED

[illegible]



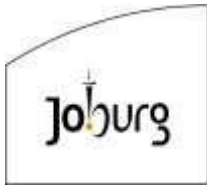
Contract JW14289R
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1.3	Installation of all associated pipework, including inlet, outlet and bypass
1.4	Solar system and telemetry
1.5	General (other items)

[illegible]

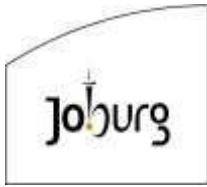
2.3	Installation of all associated pipework, including inlet, outlet and bypass
2.4	Solar system and telemetry
2.5	General (other items)
3	Health and Safety (with respect to working at heights and confined spaces and addresses the major components listed below)



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CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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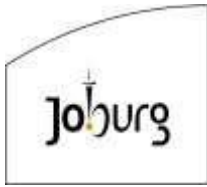
3.1	Construction of 20ML Reservoir
3.2	Construction of chambers in the reservoir complex;
3.3	Installation of all associated pipework, including inlet, outlet and bypass
3.4	Solar system and telemetry



Contract JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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3.5	General (other items)
4	Project Programme/Schedule (On <i>MS Projects or any other Gantt Chart</i>, as an Annexure) outlining a critical path, durations of tasks/activities aligned to the scope of works, linkages of tasks, aligned to the contractual timelines, and including all contractual dates. The compilation of sections 1 to 4 of the Site Specific Method Statement must be inclusive of the following components: • Construction of 20ML Reservoir; • Construction of chambers in the reservoir complex; • Installation of all associated pipework, including inlet, outlet and bypass, and Solar system and telemetry



T2.2.1 Contractor's Certificate of Registration With CIDB

NB: The Tenderer shall attach hereto the Contractor's Certificate of Registration with CIDB OR provide the CIDB registration number that JW can use to verify CIDB requirements for this tender. Failure to submit the certificate or CIDB registration number with the tender document will lead to the conclusion that the Tenderer is not registered with the CIDB and therefore not eligible to tender.

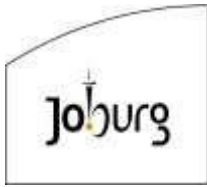
Tenderers who have made application to CIDB for registration and are capable of being so registered prior to the evaluation of submissions must attach a notification from CIDB that their application is being considered.

CIDB status to be active at the required CIDB grading at time of evaluation to avoid disqualification.

SIGNATURE:
.....

DATE:

(of person authorized to sign on behalf of the Tenderer)



T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration

The Tenderer must attach hereto a copy SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA number.

SIGNATURE: DATE:
(of person authorized to sign on behalf of the Tenderer)

**T2.3.1 JW 6.4 Returnable Annexure A: Acknowledgement of SHE Specification & Annexures****DECLARATION BY CONTRACTOR**

I, the undersigned, and representing the tenderer as indicated hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and confirm compliance thereto in the event of being successful:

- OHS Specification (Volume 3)
- Annexure 1: Baseline Risk Assessment
- Annexure 2: Medical Screening Policy
- Annexure 3: Sign off form
- Annexure 4: Environmental Management Plan

We furthermore commit to:

- Comply with all applicable SHE related legal and other requirements.
- Inform all staff of their role in managing environmental impacts and safety hazards on site.

Signed at on this Day of 20.....

Name of tenderer	
Name of Authorized person	
Authorized Signature*	



T2.3.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings

DECLARATION BY CONTRACTOR

I, the undersigned, and representing the tenderer as indicated hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and confirm compliance thereto in the event of being successful:

The drawings that are issued for **TENDER PURPOSES** are those noted below:

DRAWING NUMBER	DESCRIPTION	REV
JW14289R-000	LIST OF DRAWINGS	000
JW14289R-001	LOCALITY PLAN	000
JW14289R-002	LAYOUT PLAN	000
JW14289R-003	LAYOUT PLAN CADASTRAL	000
JW14289R-101	SITE LAYOUT	000
JW14289R-102	GENERAL ARRANGEMENT	000
JW14289R-103	SUB-SURFACE DRAINAGE LAYOUT	000
JW14289R-104	FOUNDATION & SURFACE BED LAYOUT	000
JW14289R-105	ROOF LAYOUT	000
JW14289R-106	SECTIONS AND DETAILS TAILS	000
JW14289R-107	MISCELLANEOUS DETAILS	000
JW14289R-108	POST TENSION LAYOUT & DETAILS SHEET 1-2	000
JW14289R-109	POST TENSION LAYOUT & DETAILS SHEET 2-2	000
JW14289R-110	WALL & COLUMN REINFORCEMENT DETAILS	000
JW14289R-110B	WALL & COLUMN BENDING SCHEDULE	000
JW14289R-111	SUB-SURFACE DRAINAGE LONG SECTION AND MANHOLE DETAILS	000
JW14289R-200	STANDARD DETAILS FOR TRENCH EXCAVATION AND BACK-FILL FOR STEEL PIPES > 400mm ND	000
JW14289R-201	STEEL PIPE TAPER AND BEND DETAILS	000
JW14289R-202	STORMWATER CHAMBER	000
JW14289R-203	PIPE MARKERS	000
JW14289R-204	NAME BOARD	000
JW14289R-205	CABLE DUCT MANHOLE DETAILS	000
JW14289R-206	FLOWMETER CHAMBERS - 3D VIEWS	000
JW14289R-207	6m WIDE OPENING SLIDING GATE	000
JW14289R-208	2.4m CONCRETE PALISADE FENCE DETAILS	000
JW14289R-209	TYPICAL TRENCH CROSS-SECTION FOR uPVC	000
JW14289R-210	STORMWATER MANHOLE DETAILS	000
JW14289R-220	BOUNDARY WALL DETAILS	000
JW14289R-221	BOUNDARY WALL DETAILS	000
JW14289R-222	BOUNDARY WALL DETAILS	000



Contract JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
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DRAWING NUMBER	DESCRIPTION	REV
JW14289R-240	GUARD HOUSE	000
JW14289R-241	INSTRUMENTATION HUT	000
JW14289R-300	INLET FLOW METER CHAMBER AND INSTALLATION DETAILS	000
JW14289R-301	SURFACE BED REINFORCEMENT DETAILS	000
JW14289R-301B	SURFACE BED BENDING SCHEDULE	000
JW14289R-304	RESERVOIR BYPASS PRV CHAMBER PIPE AND FITTING SCHEDULE	000
JW14289R-305	RESERVOIR BYPASS PRV CHAMBER DETAILS	000
JW14289R-306	RESERVOIR INLET PRV CHAMBER PIPE AND FITTING DETAILS	000
JW14289R-307	RESERVOIR INLET PRV CHAMBER DETAILS	000
JW14289R-308	OUTLET FLOW METER CHAMBER & INSTALLATION DETAILS	000
JW14289R-309	OUTLET ISOLATION VALVE CHAMBER & INSTALLATION DETAILS	000
JW14289R-310	TYPICAL INSULATING GASKET KIT MANHOLE DETAILS	000
JW14289R-312	TYPICAL LADDER DETAILS	000
JW14289R-400	STORMWATER CHAMBER REINFORCEMENT DETAILS	000
JW14289R-400B	STORMWATER CHAMBER BENDING SCHEDULE	000
JW14289R-402	BYPASS PRV CHAMBER REINFORCEMENT DETAILS SHEET 1-2	000
JW14289R-403	BYPASS PRV CHAMBER REINFORCEMENT DETAILS SHEET 2-2	000
JW14289R-404	INLET PRV CHAMBER REINFORCEMENT DETAILS SHEET 1-2	000
JW14289R-405	INLET PRV CHAMBER REINFORCEMENT DETAILS SHEET 2-2	000
JW14289R-406	OUTLET FLOW METER CHAMBER REINFORCEMENT DETAILS	000
JW14289R-406B	OUTLET FLOW METER CHAMBER BENDING SCHEDULE	000
JW14289R-408	OUTLET ISOLATION VALVE CHAMBER REINFORCEMENT DETAILS	000
JW14289R-408B	OUTLET ISOLATION VALVE CHAMBER BENDING SCHEDULE	000
JW14289R-409	INSULATION GASKET KIT MANHOLE	000
JW14289R-409B	INSULATION GASKET KIT MANHOLE BENDING SCHEDULE	000
JW14289R-410	INLET FLOW METER CHAMBER REINFORCEMENT DETAILS	000
JW14289R-410B	INLET FLOW METER CHAMBER BENDING SCHEDULE	000
JW14289R-501	ROOF SLAB BOTTOM B1 REINFORCEMENT DETAILS	000
JW14289R-501B	ROOF SLAB BOTTOM B1 CHAMBER BENDING SCHEDULE	000
JW14289R-502	ROOF SLAB TOP T1 REINFORCEMENT DETAILS	000
JW14289R-502B	ROOF SLAB TOP T1 CHAMBER BENDING SCHEDULE	000
JW14289R-503	ROOF SLAB TOP T2 REINFORCEMENT DETAILS	000
JW14289R-503B	ROOF SLAB TOP T2 CHAMBER BENDING SCHEDULE	000
JW14289R-510	FOUNDATION REINFORCEMENT DETAILS	000
JW14289R-510B	FOUNDATION BENDING SCHEDULE	000
JW14289R-601	TERRACE LEVEL PLANS	000
JW14289R-602	EXCAVATION & PLATFORM DETAILS	000
JW14289R-603	BULK EARTHWORK SETTING OUT POINTS	000
JW14289R-700	RESERVOIR INLET DETAILS	000
JW14289R-701	RESERVOIR OUTLET DETAILS	000
JW14289R-702	RESERVOIR OVERFLOW DETAILS	000
JW14289R-703	RESERVOIR SCOUR & OVERFLOW DETAILS	000



Contract JW14289R
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DRAWING NUMBER	DESCRIPTION	REV
JW14289R-704	RESERVOIR SCOUR & OVERFLOW PIPE TO STORMWATER MANHOLE	000
JW14289R-705	STORMWATER PIPELINE LONGSECTION	000

Signed at on this Day of 20.....

Name of tenderer	
Name of Authorized person	
Authorized Signature*	



Johannesburg Water (SOC) Ltd



CONTRACT JW14289R

**CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD
RESERVOIR**

VOLUME 1

PART 1: AGREEMENT AND CONTRACT DATA

Employer:		Contractor:	
Witness:		Witness:	



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C1.1.2 Form of Acceptance	C.4
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C1.3 FORMS AND SECURITIES	C.27
C2.1 PRICING DATA	C.38
Bill of Quantities	C.48
Summary of Bill of Quantities	C.88

Employer:		Contractor:	
Witness:		Witness:	



C1.1 FORM OF OFFER (ACCEPTANCE & AGREEMENT)

C1.1.1 Form of Offer

The Contractor is to complete and sign the Form of Offer.

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

JW 14289R: CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR.

The Contractor, 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 Contractor, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance, the Contractor 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

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

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

Signature(s)

Name(s)

Capacity

For the Contractor

(Name and address of
organisation)

**Name and signature
of witness**

(Name)

(Signature)

Date

Employer:		Contractor:	
Witness:		Witness:	



C1.1.2 Form of Acceptance

The Employer is to complete and sign the form of acceptance

By signing this part of the Form of Offer and Acceptance, the Employer identified below accepts the Contractor'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 Contractor's Offer shall form an agreement between the Employer and the Contractor 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 Volume 1:

- Part 1 Agreement and Contract Data, (which includes this Agreement)
- Part 2 Pricing Data
- Part 3 Scope of Work
- Part 4 Site Information

and drawings and documents or parts thereof, which may be incorporated by reference into Parts 1 to 4 above.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules as well as any changes to the terms of the Offer agreed by the Contractor and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Agreement. No amendments to or deviations from said documents are valid unless contained in this Schedule, which must be duly signed by the authorised representative(s) of both parties.

The Contractor shall within twenty-eight **(28) days** 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 Contact 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 of 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 Contractor receives one fully completed copy of this document, including the Schedule of Deviations (if any). Unless the Contractor (now the Contractor) within five days after 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 binding contract between the parties.

Name(s) _____

Capacity _____

For the Employer **Johannesburg Water SOC (Ltd), Turbine Hall, 65 Ntemi Piliso Street, Newtown.**

 (Name and address of organisation)

Name and signature of witness _____
 _____ (Name) _____ (Signature)

Date _____

Employer:		Contractor:	
Witness:		Witness:	



C1.1.3 Schedule of Deviations

Notes:

1. The extent of deviations from the tender documents issued by the employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender;
2. A Contractor's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here;
3. Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here; and
4. Any change or addition to the tender documents arising from the above arrangements and recorded here shall also be incorporated into the final draft of the Contract.

1	Subject	
	Details	
2	Subject	
	Details	
3	Subject	
	Details	
4	Subject	
	Details	
5	Subject	
	Details	
6	Subject	
	Details	
7	Subject	
	Details	
8	Subject	
	Details	

By the duly authorised representatives signing this Schedule of Deviations, the Employer and the Contractor agree to and accept the foregoing Schedule of deviations as the only deviations from and amendments to the documents listed in the Tender Data and addenda thereto as listed in the Tender

Employer:		Contractor:	
Witness:		Witness:	



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Schedules, as well as any confirmation, clarification or change to the terms of the offer agreed by the Contractor and the Employer during the process of offer and acceptance.

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

For the Contractor:

Signature(s)

Name(s)

Capacity

For the Contractor

(Name and address of organisation)

**Name and signature
of witness**

(Name)

(Signature)

Date

For the Employer:

Name(s)

Capacity

For the Employer **Johannesburg Water SOC (Ltd), Turbine Hall, 65 Ntemi Piliso Street, Newtown.**

(Name and address of organisation)

**Name and
signature of
witness**

(Name)

(Signature)

Date

Employer:		Contractor:	
Witness:		Witness:	



C1.2 CONTRACT DATA

C1.2.1 Part 1: Data Provided by the Employer

CONDITIONS OF CONTRACT

The General Conditions of Contract for Construction Works Third Edition (2015), published by the South African Institution of Civil Engineering, is applicable to this Contract.

Copies of these conditions of contract may be obtained from the South African Institution of Civil Engineering (Telephone number: 011-805 5947)

C1.2.1.1 Contract Specific Data

The following contract specific data are applicable to this Contract:

GCC Clause	Information
1.1.1.13	The Defects Liability Period is 52 weeks from the date of issue of the Certificate of Completion.
1.1.1.14	The time for achieving Practical Completion is 14 months.
1. 1.1.15	The name of the Employer is Johannesburg Water (SOC) Limited Contact person is Mr W. Chitsa
1.1.1.16	The name of the Employer's Agent is Mariswe (Pty) Ltd. represented by Mr. K Govender (Pr Tech Eng: 200870249 (ECSA)).
1.1.1.26	The Pricing Strategy is a Bill of Quantities.
1.2.1.2	The address of the Employer is: Physical Turbine Hall 65 Ntemi Piliso Street Newtown Postal P.O. Box 61542 Marshalltown 2107 Tel: 011 688 1603 Fax: 011 688 1521 Email: William.chitsa@jwater.co.za
1.2.1.2	The address of the Employer's Agent is: Block 1, Suite 201 Monument Office Park 79 Steenbok Ave, Postal P.O. Box 25549 Tel: 012 424 9700 Fax: 011 688 1521 Email: kubeng@mariswe.com

Employer:		Contractor:	
Witness:		Witness:	



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GCC Clause	Information
	Monument Park Monument Midrand 1685 Park, 0105
3.2.3	Specific Approval – The Employer’s Agent is required to obtain the Employer’s approval for the following: • Approval of Variation Orders • Approval to exceed the Contract Sum • The use of contingencies • Approval of Subcontracting Plan and work package breakdown • Approval of Subcontracting Plan • Stoppage/ suspension of works
4.4.2	Add the following after this clause: Apart from subcontractors identified by the Contractor for the execution of certain sections of the Works, subcontractors shall also include SMME’s (Small Medium and Micro Enterprises), who are identified from the Local Community for the execution of certain sections of the Works identified by the Contractor. The appointment of subcontractors and the allocation of work to subcontractors shall, in addition to the provisions of the General Conditions of Contract, comply with, but not be limited to, the provisions of C1.2.1.2.14 (see below). A minimum value of 15% (fifteen percent) of the Contract Price shall be subcontracted to SMME’s.
4.10.1	The Contractor shall employ labour from Local Communities (otherwise known as Local Labour), in accordance with the Tender Data, Scope of Work, Site Information, and Specifications. All Local Labour shall be recruited through the Community Liaison Officer (CLO) and/or Labour Desk Officer (LDO). The Contractor remains fully responsible for all Local Labour that are employed for the execution of the Works, as if they were the Contractor’s own labour. All Local Labour shall be recruited through the Community Liaison Officer (CLO) and/or Labour Desk Officer (LDO). The Contractor remains fully responsible for all Local Labour that are employed for the execution of the Works, as if they were the Contractor’s own labour.

Employer:		Contractor:	
Witness:		Witness:	

GCC Clause	Information
4.11.1	Add the following to this clause: Competent Employees shall include, amongst others, the following Key Personnel: • Contracts Manager • Construction Manager / Site Agent • Safety Officer The minimum requirements in terms of qualifications and experience of these Key Personnel are listed in C1.2.1.2.15 (see below).
5.3.1	The documentation required before commencement with Works execution are: • Approved Health and Safety File (Clause 4.3) • Approval of the Environmental File (Clause 4.3) • Initial programme & cashflow projections (Clause 5.6) • Guarantee from Bank or Insurance Company (Clause 6.2) • Insurance of the Works, Plant, etc. (Clause 8.6), including but not limited to: ○ SASRIA Policy ○ Liability Insurance ○ Insurance of Construction Machinery and Plant ○ Insurance of Motor Vehicle Liability, etc. • Compliance Certificate in respect of COID • Signed Notification to the Department of Labour • Construction Permit (where applicable). The Employer will require Health and Safety documentation from the Contractor to acquire this permit. • Organogram of resources • Subcontract plan/ proposal which includes a number of Subcontractors that meet requirements as per conditions of C1.2.1.2.14
5.3.2	The time to submit acceptable documentation required before Commencement of the Works is 28 days. Failure to submit the acceptable documentation within the stipulated timeframe will result in immediate termination of the appointment.
5.3.3	Time to instruct commencement of the Works Delete Clause 5.3.3 and replace with the following: The Contractor shall commence with carrying out the Works upon written instruction from the Employer's Agent to commence with the Works.
5.8.	Working days shall be Monday to Friday, between 07h00 to 17h00.
5.8.1	The non-working days are Saturdays and Sundays.
Employer:	Contractor:
Witness:	Witness:



GCC Clause	Information
	The special non-working days are all Public Holidays in terms of the Public Holidays Act (as amended), and the annual "Builder's Break" as defined by SAFCEC on an annual basis.
5.11.1.2	Delete Clause 5.11.1.2 and replace with the following: Notwithstanding any other provision of this Contract, the Contractor agrees that there shall be no suspension of the Works due to non-payment by the Employer. The Contractor shall continue to perform the Works as scheduled, regardless of any delays or failures by the Employer to make payments when due.
5.13.1	The penalty for failing to complete the Works is the greater of: An amount equal to the daily Time Related P&G rate (as calculated from the Time Related P&G section in the Bill of Quantities) or R25,000.00 per day, whichever is greater.
5.14.1	The requirements for achieving Practical Completion are: • Construction, testing & commissioning of the new 22MLWoodmead Reservoir. • All building works to be connected to water and sewer and have electrical installation with a certificate of compliance. • Construction, testing & commissioning of all pipework including inlet, outlet, overflow, scour and drainage pipelines. • Installation, testing & commissioning of all valves. • Installation, testing & commissioning of all electrical and C&I infrastructure. • Construction, testing & commissioning of all stormwater infrastructure. • Construction of the guard house (including all civil and electrical infrastructure). • Construction of the telemetry hut (including all civil, electrical and telemetry infrastructure). • Construction of the valve building (including all pipework, valves, civil and electrical infrastructure). • Construction, Installation, testing & commissioning of all security infrastructure (including fencing, gates, CCTV systems etc). • Construction of access road. • Environmental rehabilitation of site.

Employer:		Contractor:	
Witness:		Witness:	



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GCC Clause	Information
5.16.3	The latent defects period is 10 years.
6.2.1	The time to deliver the Form of Guarantee is within 28 days from the Commencement Date. The security to be provided by the Contractor shall be in the form of an "On Demand" Guarantee and will comply with the requirements of Clause 6.2.3 and C1.3 FORMS AND SECURITIES. The value of the Performance Guarantee shall be ten (10) % of the Contract Sum, which sum excludes VAT.
6.8.2	The Contract Price Adjustment is applicable to this contract. The contract rates shall be fixed for the first 12 months and thereafter the rates will be adjusted by the change in CPA (as published by Statistics SA and will be fixed for the next 12 months). The following formula will be applicable. $(1-x) \left[\frac{aLt}{Lo} + \frac{bPt}{Po} + \frac{cMt}{Mo} + \frac{dFt}{Fo} - 1 \right]$ In which the symbols have the following meaning as per GCC 2015: "x" is the proportion of "Ac" which is not subject to adjustment. "a", "b", "c" and "d" are the coefficients contained in the Contract Data, which are deemed, irrespective of the actual constituents of the work, to represent the proportionate value of labour, contractors' equipment, material (other than "special materials" specified in the Contract Data) and fuel respectively. "L" is the "Labour Index" "P" is the "Plant Index" "M" is the "Materials Index" "F" is the "Fuel Index" The suffix "o" denotes the base indices applicable to the base month as stated in the Contract Data. The suffix "t" denotes the current indices applicable to the month in which the last day of the period falls to which the relevant monthly statement relates.

Employer:		Contractor:	
Witness:		Witness:	



GCC Clause	Information
	If any index relevant to any particular certificate is not known at the time when the certificate is prepared, the Engineer shall estimate the value of such index. Any correction which may be necessary when the correct indices become known, shall be made by the Engineer in subsequent payment certificates. The value of the payment certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule, with the following values: The value of "x" is 0,10 The values of the coefficients are: a = 0,32 Labour b = 0,25 Contractor's equipment c = 0,33 Material d = 0,10 Fuel The province where the Site is located is Gauteng and the urban area where the project is implemented is Johannesburg. The base month is the month prior to the month in which the tender closing date. The Consumer Price Indices for Labour (L), Plant (P), Material (M) and Fuel (F) are as published by Statistics South Africa for the applicable time periods.
6.8.3	Price adjustments for variations in the costs of special materials are NOT allowed.
6.10.1.5	The percentage advance on materials not yet built into the Permanent Works is 80%. Proof of payment to be submitted with the claim.
6.10.3	The maximum percentage retention on the amounts due to the Contractor is 10% of the Contract Sum.
6.10.4	Delivery, dissatisfaction with and payment of payment certificates Delete Clause 6.10.4 and replace with the following: Payment shall be made upon:

Employer:		Contractor:	
Witness:		Witness:	



GCC Clause	Information
	• The Contractor providing a payment certificate with all required supporting documents to the Employer's Agent on dates to be communicated to the Contractor upon award. • The payment certificate being submitted with an original tax invoice. • A statement being submitted on the last day of the month. Payment will be made within 30 days of receipt of the Contractor's statement. Payment shall be subject to the Contractor submitting an Original Tax Invoice compliant with SARS requirements for a Valid Tax Invoice to the Employer for the amount due. Any dissatisfaction in respect of such payment certificate shall be dealt with in terms of Clause 10.2. Should there be a delay in payment from Johannesburg Water, the cause of the delay and the implications will be communicated to the Contractor. The Contractor should, based on its CIDB grading and bank rating, be in a financial position to maintain cashflow and continue with the implementation of the project in this unlikely event. The Contractor is required to maintain payments to its labour, subcontractors, suppliers and service providers to ensure implementation of works, and works should not be negatively impacted. Should the Contractor fail to comply with this requirement, penalties will apply (Refer to C1.2.1.2.1 Penalties b) Fail to pay any labour or SMME.
6.10.5	Payment of Retention Money Add to Clause 6.10.5 the following: Payment will be subject to Johannesburg Water processes as outlined in clause 6.10.4 as amended.
6.10.6.2	Delete Clause 6.10.6.2
6.11	Delete Clause 6.11.
7.8.2	Cost of making good of defects Amend Clause 7.8.2.1 as follows:

Employer:		Contractor:	
Witness:		Witness:	



GCC Clause	Information
	In the first line, correct the spelling of 'therefore'.
8.1.5	Add to the end of Clause 8.1.5 the following text: "Although the Employer has made certain provisions for the protection of the Works and the Site in the Pricing Data, the Contractor shall ensure that any and all additional requirements for the protection of the Works and the Site are adequately catered for in his rates and/or prices."
8.4.1.1	Add to the end of Clause 8.4.1.1 the following text: "hereby indemnifies the Employer against any liability in respect of damage or physical loss of property of any person or injury or death of any person due to non-compliance with the Occupational Health and Safety Act (Act 85 of 1993).
8.6.1.1.3	The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is an amount equal to 15% of the Contract Price.
8.6.1.2	Delete clause 8.6.1.2 and replace with the following: Following the introduction of legislation affecting the articles of the South African Special Risks Insurance Association (SASRIA) , insurance cover for loss or damage to the Works caused by any event defined as a risk in terms of the insurance offered by SASRIA, must be provided by the Contractor under a certificate issued by SASRIA.
8.6.1.3	The limit of indemnity for liability insurance is R20,000,000 (Twenty million Rand) for any single claim – the number of claims to be unlimited during the Construction and Defects Liability Periods
8.6.1.5	In addition to the insurances required in terms of General Conditions of Contract Clauses 8.6.1.1 to 8.6.1.4 the following insurance is also required: a. The Contractor shall insure all Construction Machinery and Plant (including tools, offices and other temporary structures and content) and other items, other than those intended for incorporation into the works, owned, leased or hired and brought on to the Site against all risks of physical loss or damage for the period that such Plant shall be on the Site to the full value thereof. In respect of Machinery and Plant brought on to the Site by or on behalf of Sub-Contractors, the Contractor shall be deemed to have complied with the provisions of this Sub-Clause if it has ensured that such Sub-Contractors have similarly insured such Plant and Machinery. Such insurance shall be effect with an Insurer and in terms approved by the Employer (which approval shall not be unreasonably withheld) and the Contractor shall, when

Employer:		Contractor:	
Witness:		Witness:	



GCC Clause	Information
	required, submit to the Employer's Insurance Brokers, via the Employer's Agent, the policy or policies of insurance and receipts for payment of the current premiums. b. The Contractor and the Sub-contractors shall effect and maintain at their cost, insurance under the provision of the Compensation for Occupational Injuries and Diseases Act (COID), 1993 (Act No. 130 of 1993) c. The Contractor and the Sub-Contractors shall effect and maintain at their own cost, motor vehicle liability insurance with at least indemnification for "balance of third party" risks, including passenger liability with a limit of indemnity of not less than R2,5 million. d. Where the contract involves manufacturing and/or fabrication of the works or part thereof at premises other than the Site, the Contractor shall satisfy the Employer that all materials and equipment for incorporation in the works are adequately insured during manufacture and/or fabrication. In the event of the Employer having an insurable interest in such works during manufacture or fabrication then such interest shall be noted by endorsement to the Contractor's Policies of Insurance. e. Any other Insurance cover that may be deemed necessary by the Contractor to ensure full and successful completion of the Works. The Client does not furnish any Insurances on the contract.
8.6	Add the following clause to 8.6 In addition to any statutory obligations, or other requirements contained in the Conditions of Contract or in the Insurance Policy and Documents the Contractor shall report in writing to the Employer's Agent every accident within 48 hours of its occurrence, whether such accident is in respect of damage to persons or property. The report shall contain full details of the accident. The Employer's Agent shall have the right to make all and any enquiries either on the Site or elsewhere as to the cause and results of any such accident and the Contractor shall give the Employer's Agent full access and facilities for carrying out such enquiries. The Employer's Agent shall be given full and immediate access to all communication, reports, findings, assessments, etc. between the Contractor and its Insurance Broker (or Insurance Provider), particularly as it relates to the processing and outcomes of any and all claims. The Contractor shall further allow and authorise the Employer's Agent to communicate with its Insurance Broker (or Insurance Provider) to obtain any and all such information as the Employer's Agent deems necessary.

Employer:		Contractor:	
Witness:		Witness:	



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GCC Clause	Information
10.3.4	Add the following new clause: Continuation of works during dispute resolution Notwithstanding any Dispute Notice that may have been issued or actual dispute or disagreement that may have arisen between the Employer and the Contractor, the Contractor shall continue to perform the Works as scheduled. Both parties agree that the resolution of any disputes shall proceed in parallel with the ongoing performance of the Works, ensuring that the project timeline is maintained without interruption.
10.4.2	Dispute resolution shall be by Amicable Settlement, failing which, any dispute shall be resolved by way of ad-hoc Adjudication.
10.5.3	The number of Adjudication Board Members to be appointed is one (1).
10.7.1	The determination of disputes shall be by arbitration.

Employer:		Contractor:	
Witness:		Witness:	



C1.2.1.2 Additions

The additional Conditions of Contract are:

C1.2.1.2.1 Penalties

In addition to GCC clause 5.13, during the Contract Period should the Contractor:

a) Fail to report

- The Employer shall levy a penalty on Contractor, should the latter fail to provide reporting as required in C1.2.1.2.6, C1.2.1.2.14 and the specification highlighted in the Scope of Work in PS 3.2, PS 6.11 and PS 6.13, with regard to content and frequency, whilst as per the Pricing Data section no payment for work completed shall be processed.
- The penalty value shall be R5,000.00 per report per day; and If the Contractor fails to complete the aforementioned more than three incidents and should the Employer or his duly authorised representative find that the Contractor is hindering his (the Employer's) deliverables to JW Senior Management, he shall reserve the right to:
 - i. perform the Works internally or through another Contractor; and
 - ii. deduct additional costs incurred by the Employer from monies owed to the Contractor or from the Contractor's Guarantee. Additional costs incurred by the Employer shall include all claims from Contract affected parties, claims such as but not be limited to claims from customers, any costs associated with the loss of water, and all costs associated with the procurement of an alternative Contractor.
 - iii. terminate the Contract.

No liability in terms of this clause shall be attached to the Contractor if he can prove to the satisfaction of the Employer that the nature of the failure is due to fire, war, riot, strikes, act of God, lockout, accident or other unforeseen occurrences or circumstances beyond the Contractor's control, provided, however, that in all cases the Contractor has notified the Employer in writing within 24 hours of it first coming to his notice, that delivery shall be delayed or become impossible for the above-mentioned reasons.

b) Fail to pay any labourer or SMME

- The Employer shall levy a penalty on the Contractor, should the latter fail to provide payment to any labourer or SMME as required in the specification highlighted in the Scope of Work and/or specified in the appointment agreements with the Contractor and the labourer or SMME.
- The penalty value shall be R 50,000.00 per incident per occasion; and
- Should non-payment of labourers or SMME's negatively affect the progress of works with reference to the approved construction programme, the Employers Agent will immediately follow the guidance provided within the "SAICE General Conditions of Contract for Construction Works (2015) attributed to GCC 5.7.1.

Employer:		Contractor:	
Witness:		Witness:	



- If the Contractor fails to complete the aforementioned more than three incidents and should the Employer or his duly authorised representative find that the Contractor is hindering his (the Employer's) deliverables to JW Senior Management, he shall reserve the right to:
 - i. perform the Works internally or through another Contractor; and
 - ii. deduct additional costs incurred by the Employer from monies owed to the Contractor or from the Contractor's Guarantee. Additional costs incurred by the Employer shall include all claims from Contract affected parties, claims such as but not be limited to claims from customers, any costs associated with the loss of water, and all costs associated with the procurement of an alternative Contractor.
 - iii. terminate the Contract.

No liability in terms of this clause shall be attached to the Contractor if he can prove to the satisfaction of the Employer that the nature of the failure is due to fire, war, riot, strikes, act of God, lockout, accident or other unforeseen occurrences or circumstances beyond the Contractor's control, provided, however, that in all cases the Contractor has notified the Employer in writing within 24 hours of it first coming to his notice, that delivery shall be delayed or become impossible for the above-mentioned reasons.

c) Failure to achieve targets in terms of Contract Participation Goals

If the Contractor fails to achieve the monetary value of the target set by the Employer for contract participation by local SMME Contractors in terms of **C1.2.1.2.14**, Procurement and Particular Specifications in Scope of Works clause PS3.2.3, the Contractor shall be liable to the Employer for a sum calculated in accordance with the Contract Data and the aforementioned Scope of Works as a penalty for such underachievement."

The penalty for failing to achieve the monetary value of the target set by the Employer for contract participation by Targeted Enterprises and local SMME Contractors in terms of Small Contractor Development of Particular Specifications in PS3: Scope of Works, is 50% of the monetary value by which the achieved monetary value falls short of the target monetary value.

- d) Failure to meet the Environmental, Health and Safety Compliance target monthly compliance rating will be calculated for each Contractor as per a formula determined by the Employer focusing on or incorporating outcomes of assurance (e.g. monthly audit), operational assessments and other requirements, as necessary.
- i. If the Contractor fails to achieve the score as stipulated in the Environmental scorecard, the Employer will levy a penalty against the Contractor. Should the Contractor achieve a score of between 85.0% and 93.0% for 2 (two) successive months; OR achieve a score below 85.0% in any 1 (one) month, the penalty shall be levied. The penalty value shall be R10,000.00 for each non-compliant event
 - ii. If the Contractor fails to achieve the score as stipulated in the Occupational Health & Safety requirements, the Employer will levy a penalty against the Contractor. Should the Contractor achieve a score of between 85.0% and 93.0% for 2 (two) successive

Employer:		Contractor:	
Witness:		Witness:	



months; OR achieve a score below 85.0% in any 1 (one) month, the penalty shall be levied. The penalty value shall be R10,000.00 for each non-compliant event.

e) Penalties irreversible

The Contractor shall note that all penalties once imposed shall be non-recoverable or non-reversible, even if the default is remedied.

f) Penalties payable

If penalties are payable, they will be deducted prior to the addition of (VAT) but after the calculation of retention.

C1.2.1.2.2 Source of instructions

The Contractor shall neither seek nor accept instructions from any authority external to the Employer's Agent in connection with the performance of his services under this Contract. The Contractor shall refrain from any action which may adversely affect the Employer and shall fulfill his commitments with fullest regard for the interest of the Employer. The Contractor may only accept and comply with instructions from the Employer's Health and Safety Representative or the Employer's Environmental Representative with regards to matters regarding Health & Safety or Environmental Management respectively, but with further approval from the Employer's Agent.

C1.2.1.2.3 Officials not to benefit

The Contractor warrants that no official of the Employer has been or shall be admitted by the Contractor to any direct or indirect benefit arising from this Contract or the award thereof. The Contractor agrees that breach of this provision is a breach of the Contract.

C1.2.1.2.4 Prevention of corruption

The Employer shall be entitled to cancel the Contract and to recover from the Contractor the amount of any loss resulting from such cancellation, if the Contractor has offered or given any person any gift or consideration of any kind as an inducement or reward for doing or intending to do any action in relation to the obtaining or the execution of the Contract or any other contract with the Employer or for showing or intending to show favor or disfavor to any person in relation to the Contract or any other contract with the Employer. If similar acts have been done by any persons employed by the Contractor or acting on his behalf whether with or without the knowledge of the Contractor in relation to this or any other Contract with the Employer, the same consequences shall apply.

C1.2.1.2.5 Confidential nature of documents

All maps, drawings, photographs, mosaics, plans, reports, recommendations, estimates, documents and all other data compiled by or received by the Contractor under the Contract shall be the property of the Employer, shall be treated as confidential and shall be delivered only to the Employer's Agent or his duly authorized representative on completion of the Works; their contents shall not be made known by the Contractor to any person other than the personnel of the Contractor performing services under this Contract without the prior written consent of the Employer.

Employer:		Contractor:	
Witness:		Witness:	



C1.2.1.2.6 Returns of labour, SMME, plant, equipment and material

The Contractor shall provide a return in detail in the form and at such intervals as the Employer's Agent or his duly authorized representative may prescribe showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting construction plant, equipment and material as the Employer's Agent or his duly authorized representative may require. Reporting as per JW6.1. The supporting documents required for SMMEs include but are not limited to the following:

- A completed and signed sub-contracting agreement between the Contractor and the SMME
- Valid CIPC registration (i.e. CK, COR)
- SA ID copies of owners
- Active CIDB membership: minimum grading 1CE
- Valid CSD compliance status
- Valid EME affidavit
- COIDA certificate
- Company Profile including similar experience and skilled personnel CVs
- Health and Safety Plan
- Proof of Payments

The supporting documents required for local labourers include but are not limited to the following:

- A completed and signed employment contract between the Contractor and labourer
- Certified Copies of IDs
- Individual contracts
- Monthly Individual proof of payment
- Monthly Individual timesheets
- Training returns
- UIF forms (proof of registration from Labour)

C1.2.1.2.7 Materials and workmanship

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Employer's Agent's instructions and shall be subjected from time to time to such tests as the Employer's Agent may direct at the place of manufacture or fabrication, or on the Site or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any materials used and shall supply samples of materials before incorporation in the Works for testing as may be selected and required by the Employer's Agent. All testing equipment and instruments provided by the Contractor shall be used only by the Employer's Agent or by the Contractor in accordance with the instructions of the Employer's Agent.

Employer:		Contractor:	
Witness:		Witness:	



- a) No material not conforming with the Specifications in the Contract shall be used for the Works without prior written approval of the Employer and instruction of the Employer's Agent, provided always that if the use of such material results or may result in increasing the Contract Price, the procedure in GCC clause 6.3 (Variations) shall apply.

C1.2.1.2.8 Examination of the work before covering up

No work shall be covered up or put out of view without the approval of the Employer's Agent or his duly authorized representative and the Contractor shall afford full opportunity for the Employer's Agent or his duly authorized representative to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Employer's Agent whenever any such work or foundations is or are ready or about to be ready for examination. The Employer's Agent or his duly authorized representative shall without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such work or of examining such foundations.

C1.2.1.2.9 Employer's Agent's power to order removal of improper work and materials

The Employer's Agent or his duly authorized representative shall during the progress of the Works have power to order in writing from time to time, and the Contractor shall execute at his cost and expense, the following operations:

- a) removal from the Site within such time or times as may be specified in the order of any materials which in the opinion of the Employer's Agent are not in accordance with the Contract.
- b) substitution of proper and suitable materials; and
- c) removal and proper re-execution (notwithstanding any previous test thereof or interim payment therefore) of any work which in respect of materials or workmanship is not in the opinion of the Employer's Agent or his duly authorized representative in accordance with the Contract.

C1.2.1.2.10 Default of Contractor in carrying out Employer's Agent's or his duly authorized representative's Instructions

In case of default on the part of the Contractor in carrying out an instruction of the Employer's Agent or his duly authorized representative, the Employer shall be entitled to employ and pay other persons to carry out the same, and all expenses consequent thereon or incidental thereto shall be borne by the Contractor and shall be recoverable from him by the Employer and may be deducted by the Employer from any monies due or which may become due to the Contractor.

C1.2.1.2.11 Date falling on public holiday or weekend

Where under the terms of the Contract any act is to be done or any period is to expire upon a certain day and that day or that period fall on a day of rest or recognized public holiday or weekend, the Contract shall have effect as if the act were to be done or the period to expire upon the working day following such day.

Employer:		Contractor:	
Witness:		Witness:	



C1.2.1.2.12 Ambiguities and inconsistencies

The Employer or the Contractor shall notify the other as soon as either becomes aware of an ambiguity or inconsistency in or between the documents, which are part of this Contract. Governed by the spirit and intention of the Contract, the Employer shall give a binding instruction resolving the ambiguity or inconsistency.

C1.2.1.2.13 False claims by the Contractor

- a. Failure, by the Contractor, to demonstrate or present any feature declared during the procurement stage shall constitute grounds for Contract termination or the market related equivalent price discount, if no market related value is available, the Employer shall give a final ruling on the amount. This shall be at the discretion of the Employer based on the implication of such omission. Should the Contractor refuse to accept the Employer's price, the Contract shall be terminated.
- b. Any false claims by the Contractor or his staff (with or without his knowledge), based on Works to be performed or completed per site stage shall constitute grounds for Contract termination and result in blacklisting on the Employer's database.

The Contractor shall note that any of the above shall constitute non-performance on the part of the Contractor, further resulting in him forfeiting his full Contract Guarantee.

C1.2.1.2.14 Special Conditions

The successful Tenderer must subcontract a minimum of 15% (fifteen percent) of the value of this Contract to an entity(s) described below. The value of the Contract for the purposes of this calculation shall be equal to the Contract Price (excluding VAT) as described in the General Conditions of Contract.

The subcontractor/s or SMME's chosen for this purpose must be registered on National Treasury's Central Supplier Database (CSD) and must be from one of the following designated groups:

- An EME or QSE which is at least 51% owned by black people;
 - An EME or QSE which is at least 51% owned by black people who are youth;
 - An EME or QSE which is at least 51% owned by black women;
 - An EME or QSE which is at least 51% owned by black people with disabilities;
 - An EME or QSE which is 51% owned by black people living in rural or underdeveloped areas or townships;
 - A cooperative which is at least 51% owned by black people;
 - An EME or QSE which is at least 51% owned by black people who are military veterans;
 - an EME or QSE .
1. Subcontractors must be chosen from National Treasury's Central Supplier Database which can be accessed on National Treasury's website.
 2. The Contractor shall identify work packages that will be allocated to Subcontractors, so that the minimum requirement of 15% can be met during the implementation of the project, as follows:
 - The Contractor shall develop a Subcontracting Plan that sets out the details of the

Employer:		Contractor:	
Witness:		Witness:	



proposed Subcontracting arrangements including, but not limited to, competitive bidding process to be used for the appointment of SMME's, scope of work to be allocated, criteria for the selection of Subcontractor(s), Subcontractor agreements, cost of the work to be Subcontracted, etc.

- The Subcontracting Plan shall be developed in consultation with the Employer (or his representative), the Ward Councillor and / or Community Liaison Officer, who shall assist the Contractor in identifying SMME's and other skills that may be available in local and surrounding communities.
- The Subcontracting Plan shall be issued to the Employer's Agent for approval, prior to the engagement of any Subcontractor(s) by the Contractor. The activities, time periods, linkages, etc. associated with the development and approval of the Subcontracting Plan shall be included in the Project Programme, which Programme is subject to the approval of the Employer's Agent. A period of four weeks will be required for the Employer's Agent to consult with the Employer, prior to approval of the Subcontracting Plan.
- The Contractor shall ensure that rates that are tendered (during Tender Stage) for work items that are likely to be Subcontracted, are market related rates. Provision is made in the Bill of Quantities (BoQ) for the Contractor to add a mark-up for the sourcing, handling, and management of Subcontractors, SMME's, and the like, for the duration of the Contract.
- On or during appointment of Subcontractors, should Subcontractors **prove** that rates, that have been tendered by the Contractor for BoQ work items that are being subcontracted, are not market related, the Contractor will be liable to cover the cost of the difference, i.e. the difference in rate tendered by the Contractor versus the rate that is being requested by the Subcontractor. This difference in cost will be for the Contractor's account, and no Variation Orders for additional costs will be entertained by the Employer. The Contractor bears the full and complete risk for the rates that have been tendered by the Contractor during Tender Stage.
- In the event that a rate supplied by the Contractor for a specific BoQ work item is not sufficient to cover Subcontractor costs/rates for that specific item, the Contractor shall provide a detailed rate breakdown for that specific BoQ item (and each and every subsequent BoQ work item where the rate is not sufficient to cover Subcontractor cost); and shall indicate costs (amongst others) for labour, material, handling, mark-ups, etc. to prove that the rate that was submitted during tender stage was in fact market related; and in balance with other rates that were submitted for work items that will not be undertaken by Subcontractors.
- Should any delays be experienced during the period of the Contract due to the appointment of subcontractors by the Contractor, work stoppages by subcontractors, industrial action by subcontractors, etc. such delays shall be assigned to the Contractor, and no claims for Extension of Time will be entertained by the Employer.
- The Contractor will be liable to pay a penalty if the Subcontracting target of minimum 15% has not been met by the end of the Contract. The Employer will deduct this penalty amount through the Payment Certificate process. The Employer will monitor progress by the Contractor towards achieving the target and shall have full discretion as to when the penalty will be applied (i.e. the month in which the penalty amount will be deducted).

Employer:		Contractor:	
Witness:		Witness:	



In calculating the total amount that has been (will be) paid to SMME's, all amounts that have actually been reimbursed to SMME's will be taken into account including P&G's, amounts for actual work done, etc.

- The penalty amount described above shall be equal to 50% (fifty percent) of the difference between the target Subcontract amount (i.e. minimum 15% of the Contract Price) and the actual amount that has been spent on Subcontractors/SMME's by the end of the Contract.
3. A Subcontracting agreement between the Main Contractor and the Subcontractor shall be submitted to JW upon appointment of any Subcontractor and must include the following minimum information:
- Name of Subcontractor and BBBEE status
 - Subcontractor *domicilium* and registered address of business, as well as status of compliance with all applicable legal requirements.
 - Area and location of project
 - Scope of Work issued to the Subcontractor
 - Value of the Work issued including P&G's (this information must be submitted in a format that is readily auditable).
 - Assistance provided/to be provided to the Subcontractor by the Contractor, e.g. acquisition of materials, machinery, tools, etc.
 - A Skills Transfer Plan which will indicate, amongst others, the proposed skills that will be transferred to the Subcontractor, individuals that will be identified for skills transfer, the amount that will be spent by the Contractor on skills transfer, evidence that will be produced by the Contractor (such as training certificates, training registers, etc.), etc.
 - A specific provision that enables the Contractor to pay the Subcontractor's suppliers, labour (skilled, local, etc.) or any other service provider of the Subcontractor, should the Subcontractor fail to do so. This provision shall include (but not be limited to) the following conditions/provision's:
 - Invoices that are due for payment from suppliers and the like must be invoices that have been approved for payment and be based on work or services that have actually been completed or delivered. Payments that are due to labour will be based on approved timesheets.
 - The Contractor is to ensure that any invoice presented for payment is indeed an approved invoice, and that the necessary work or services have been delivered or completed. The approved invoice shall be settled (paid) by the Contractor (on behalf of the Subcontractor) by the due date for payment.
 - The Contractor will be entitled to deduct payments made to any third party, on behalf of the Subcontractor, from subsequent payments that may become due to the Subcontractor.
 - The Contractor will be entitled to bill the Subcontractor a mark-up on the payments made on behalf of the sub-contractor. The mark-up shall not be more than 10% (ten percent) of the amount actually paid (i.e. the amount (excluding VAT) reflected on the invoice that has been settled). The mark-up amount shall be deducted from subsequent payments that may become due to the Subcontractor.

Employer:		Contractor:	
Witness:		Witness:	



- Proof of any such payments made on behalf of the Subcontractor shall be issued to the Employer's Agent, on request, with all necessary supporting information that the Employer's Agent may request
 - Payments made on behalf of the Subcontractor are not subject to the Contractor first being paid by the Employer. Therefore, the Contractor shall pay approved invoices, on behalf of the Subcontractor, irrespective of whether the Contractor has first been paid by the Employer. The Contractor will be entitled to levy interest on all payments that have been made in this regard, in accordance with the necessary interest payment provisions contained in the General and Special Conditions of Contract.
4. The successful Contractor shall submit monthly SMME/Subcontractor reports to the Employer's Agent as follows:
- Status of progress against the Subcontracting Plan (described above), to the approval of the Employer's Agent
 - Subcontractor *domicilium* and registered address of business, as well as ongoing status of compliance with all applicable legal requirements.
 - Name of Subcontractor and BBBEE status
 - Area and location of project
 - Scope of work issued to the Subcontractor
 - Value of the work issued (this information must be submitted in a format that is readily auditable)
 - Monthly payments made to the subcontractor (this information must be submitted in a format that is readily auditable)
 - Assistance provided to the Subcontractor e.g. advance payments, acquisition of materials, machinery, tools, etc.
 - Performance of the Subcontractor, with evidence to support this performance assessment.
5. Upon completion of the project, the Contractor is required to provide a final report to JW on skills transferred to / acquired by the Subcontractor(s) engaged on the Project, description and value of work performed, as well as their overall performance. This report must be issued to JW to enable a Certificate of Completion to be issued.
6. The Contractor shall also indicate whether the experience gained by the Subcontractor is sufficient to assist the Subcontractor to improve their CIDB grading, with full details of supporting information.

Employer:		Contractor:	
Witness:		Witness:	

C1.2.1.2.15 Competent Employees

Competent Employees	Qualifications	Experience
Contracts Manager	Minimum Qualifications of Contracts Manager: - Bachelor's degree in Civil engineering OR - Construction Management, equivalent or higher. AND - Professional Registration – Pr. Eng. / Pr. Tech (Eng) / PrCPM / PrCM will obtain a score for the experience of a Contracts Manager	Minimum of three (3) completed projects involving construction of reinforced concrete reservoir of 20ML or more and bulk steel pipework of diameter 450mm or more completed as Contracts Manager
Construction Manager	Minimum Qualifications of Site Manager: - National Diploma in Civil/ Structural Engineering or higher. AND - Registered as a Candidate Professional in the Built Environment or higher will be considered.	Minimum of three (3) completed projects involving the construction of reinforced concrete reservoirs of 20ML or more completed as Construction Manager (or any other title) where the individual was site based, and managed a construction site
Safety Officer	Minimum Qualifications of Safety Officer; National Diploma (Safety Management) / National Diploma Environmental Health / Environmental Science / Environmental Management / SAMTRAC / SHEOMTRAC / SHEMTRAC / MESHTRAC / NEBOSH / Safety Officers Course (NQF 5) or higher,	Minimum of three (3) completed Civil / Structural engineering project completed as Safety Officer

Employer:		Contractor:	
Witness:		Witness:	



	AND Professional Registration with SACPCMP in the Construction Health and Safety Sector. Registered with SACPCMP in the “Construction Health and Safety” Sector will be considered. However, the time of registration of Safety Officer will not impact post qualification number of projects	

C1.2.1.2.16 Tie-in Limitations

The connection of new pipework to the existing water infrastructure is prohibited between Friday and Monday every week and five days before the Builders Break. All tie-ins must be completed within 10 hours of work.

C1.2.1.3 Variations to General Conditions of Contract

Add to the following

3.2.4	Employer’s Agent for Health and Safety Replace Clause 3.2.4 with the following: ‘In terms of Clause 1.3.2, all parties to the Contract shall be subject to the relevant requirements of the Construction Regulations 2014 (as amended) of the Occupational Health and Safety Act, Act 85 of 1993 (as amended).’ Add the following at the end of the above new replacement Clause 3.2.4: ‘Where the Employer is obliged to appoint an Employer’s Agent for Health and Safety in terms of the Construction Regulations 2014 (as amended) of the Occupational Health and Safety Act (Act 85 of 1993 as amended), and where such Employer’s Agent for Health and Safety has complied with the registration requirements of a Construction Health and Safety Agent as a specified category in terms of section 18(1) (c) of the Project and Construction Management Professions Act (Act 48 of 2000), the applicable clauses of the latest edition of the “Standard Scope of Services for Construction Health and Safety Agents Registered In Terms Of Section 18(1)(c) of the Project And Construction Management Professions Act (Act No. 48 Of 2000)”, including Clauses

Employer:		Contractor:	
Witness:		Witness:	



	2.2.5 “STAGE 5 - CONSTRUCTION DOCUMENTATION AND MANAGEMENT”, and 2.2.6 “STAGE 6 - PROJECT CLOSE – OUT”, and 2.2.7 “ADDITIONAL RELATED SERVICES”, as published in “Registration Rules for Construction Health and Safety Agents in Terms of Section 18 (1) (c) of the Project and Construction Management Professions Act, 2000 (Act No. 48 of 2000)” by the South African Council for Construction and Project Management Professionals in terms of the Project and Construction Management Professions Act (Act 48 of 2000 as amended), shall also apply.’
5.1.1.2	Time Calculations SEPARATE THE PHRASE “shall be excluded from the calculation of the time-span concerned.” BY MOVING IT ONTO A NEW LINE AS A NEW PARAGRAPH, AND PROMOTE THAT PARAGRAPH BY ONE PARAGRAPH LEVEL TO A POSITION WHERE IT FORMS THE LAST PART OF SUB-CLAUSE 5.1.1, SO THAT SUB-CLAUSE 5.1.1.2 READS AS FOLLOWS: 5.1.1.2 The day on which the timespan commences shall be excluded from the calculation of the timespan concerned.”
5.7.1	Rate of Progress ON PAGE 25, IN THE TOP PARAGRAPH, FOR THE SENTENCE COMMENCING WITH “Such steps shall...” REPLACE THE SENTENCE “Such steps shall be approved by the Employer's Agent, which approval shall not be unreasonably withheld.” WITH “Such steps shall be subject to the approval of the Employer's Agent, which approval shall not be unreasonably withheld.”
6.5.1.3	Basis of payment for dayworks ON PAGE 40, IN THE LAST LINE OF THE SUB-CLAUSE, REPLACE THE PHRASE “ruling plant hire rates” WITH “ruling construction equipment hire rates”

Employer:		Contractor:	
Witness:		Witness:	

C1.2.2 Part 2: Data Provided by the Contractor

GCC Clause	Information						
Clause 1.1.9	The name of the Contractor is:..... The Contact person is:.....						
Clause 1.2.1.2	The address of the Contractor is: Physical Address: Postal Address: <table border="1"> <tr> <td></td><td></td></tr> </table> <table border="1"> <tr> <td></td><td></td></tr> </table> Tel: Fax: <table border="1"> <tr> <td></td><td></td></tr> </table> Email:						
Clause 1.1.1.14	The time for achieving Practical Completion is 14 months from the Commencement Date						
Clause 6.2.1	The security to be provided by the Contractor shall be one of the following: “On Demand” Guarantee of 10% of the Contract Sum (which sum shall exclude VAT) under Forms and Securities Part C1.3.1.						
Clause 6.8.3	The variation in cost of special materials is <table border="1"> <thead> <tr> <th>Type</th><th>Unit</th><th>Rate</th></tr> </thead> <tbody> <tr> <td colspan="3">NOT APPLICABLE</td></tr> </tbody> </table>	Type	Unit	Rate	NOT APPLICABLE		
Type	Unit	Rate					
NOT APPLICABLE							

Employer:		Contractor:	
Witness:		Witness:	

Johannesburg Water (SOC) Ltd



CONTRACT NO. JW14289R

**CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD
 RESERVOIR**

VOLUME 1

PART 1.3: FORMS AND SECURITIES

Employer:		Contractor:	
Witness:		Witness:	



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Employer:		Contractor:	
Witness:		Witness:	



C1.3 FORMS AND SECURITIES

FORMS FOR COMPLETION BY THE CONTRACTOR

THE FOLLOWING FORMS ARE TO BE COMPLETED BY THE CONTRACTOR AFTER THE TENDER HAS BEEN AWARDED TO THE SUCCESSFUL TENDERER

- a) Form of Guarantee
- b) Blasting Indemnity
- c) Agreement in terms of the Occupational Health and Safety Act
- d) Occupational Health and Safety Indemnity Undertaking

The forms will be completed by the Contractor who will be instructed to do so in the Form of Acceptance. The completed forms will become part of the Contract.

The Form of Guarantee is a pro forma document. The Contractor will provide an original document, from a financial institution, with the same text within the time stated in the Contract Data. Only a Bank or approved Insurance Company or Guarantee Corporation is acceptable as Guarantor.

Employer:		Contractor:	
Witness:		Witness:	



C1.3.1 Form of Guarantee

TO BE PRINTED ON THE OFFICIAL LETTERHEAD OF THE GUARANTOR.

FORM OF ON DEMAND GUARANTEE IN RESPECT OF PERFORMANCE

GUARANTEE REFERENCE NUMBER: [*]**

FORM OF ON DEMAND PERFORMANCE GUARANTEE

Whereas [insert the full name of the *Employer*], registration number: [insert registration number], of [insert full physical address] (the “*Employer*”) has awarded a contract for [insert a detailed description of the contract], under contract number: [insert details] (the “*Contract*”), to [insert full names of the *Contractor*], registration number [insert details], of [insert full physical address] (the “*Contractor*”).

And whereas the Contract requires the *Contractor* to provide to the *Employer* an on-demand performance guarantee for the due and proper performance by the *Contractor* of its obligations in terms of the Contract.

Now therefore: [insert full names of the Guarantor], registration number [Insert details], of [insert the full physical address] (the “*Guarantor*”), duly represented by the undersigned: [insert the full names of the signatory], and [insert the full names of the signatory], acting herein in their respective capacities as: [insert full title] and [insert full title] respectively, of the Guarantor, and being duly authorized to sign this on demand performance guarantee (this “*Guarantee*”) and to incur obligations in relation thereto, in the name, and on behalf, of the Guarantor under, and in terms of, a Resolution of the Board of Directors or other written authority of the Guarantor, hereby irrevocably and unconditionally guarantees and undertakes that:

1. The Guarantor shall pay to the *Employer* on demand any sum or sums not exceeding the following aggregate amount: R [insert the amount] (the “*Guaranteed Amount*”) on presentation of a written demand signed by the *Employer* (the “*Demand*”), supported by a written statement signed by the *Employer* certifying that the *Contractor*, in the opinion of the *Employer* as at the date of issue of such Demand, is in breach of its obligations under the Contract or that a defect had occurred following the performance by the *Contractor* of its obligations under the Contract, and without being required to prove or set out the nature of any such breach or defect.
2. Neither the failure of the *Employer* to enforce strict or substantial compliance by the *Contractor* with its obligations under the Contract nor any act, conduct or omission by the *Employer* prejudicial to the interests of the Guarantor will discharge the Guarantor from liability under this Guarantee.
3. This Guarantee:

Employer:		Contractor:	
Witness:		Witness:	



- 3.1 automatically comes into full force and effect on the date of signature hereof by the Guarantor.
- 3.2 automatically expires, whether or not returned to the Guarantor at the earlier of:
- 3.2.1 [the *defects date*; or]
- 3.2.2 90 (ninety) calendar days after the date of termination of the Contract, as notified in writing to the Guarantor by the *Employer*; or
- 3.2.3 **[insert time]** (Central African Time), at the abovementioned address of the Guarantor on **[insert date]**,

(the “**Expiry Date**”);

- 3.3 constitutes the primary obligations of the Guarantor and exists independently of the Contract or any amendment, variation or novation thereof; and
- 3.4 is governed by the laws of the Republic of South Africa and any dispute arising hereunder shall be subject to the jurisdiction of the South African courts. In respect of such proceedings, each of the Parties specifically consents to the non-exclusive jurisdiction of the High Court of South Africa (Gauteng Local Division, Johannesburg).
4. Any Demand must be presented at the aforementioned address of the Guarantor on or before the Expiry Date. After the Expiry Date, this Guarantee shall become null and void, whether returned to the Guarantor for cancellation or not and any Demand received after the Expiry Date shall be ineffective.
5. The *Employer* may require the *Contractor* to extend this this Guarantee or replace it if the guarantee sum has not been paid in full by the date 28 days prior to the Expiry Date. If the guaranteed sum has not been paid in full by the date 28 days prior to the Expiry Date, and the guarantee has not been extended, the Guarantor unconditionally undertakes to pay to the *Employer* any amounts which the *Contractor* has not repaid (subject to the guaranteed sum) upon receipt by the *Employer*, within such 28 day period, of written demand for payment made in accordance with the terms of the advance payment guarantee.
6. Payments made in terms of this Guarantee shall be in cash, free of any set-off, withholding, counterclaim or deduction of any nature whatsoever.

Employer:		Contractor:	
Witness:		Witness:	



7. This Guarantee is transferable by the *Employer*, and the Guarantor consents to any transfer of this Guarantee by the *Employer* to any of its affiliates or any other person. This Guarantee is restricted to the payment of a sum of money only and limited to an aggregate amount equal to the Guaranteed Amount.
8. The Guarantor warrants that it has the power and has taken all action and obtained all licenses and approvals required for it, to grant and perform its obligations in terms of this Guarantee.
9. The Guarantor acknowledges that the *Employer* may make multiple demands under this Guarantee provided that the aggregate amount paid by the Guarantor in terms of this Guarantee shall not, at any time, exceed the Guaranteed Amount.
10. The Guarantor's obligations under this Guarantee are of a primary, independent nature and are not ancillary, accessory nor of a collateral nature, to the Contract. Any reference in this Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship.
11. For the purposes of this Guarantee, the abovementioned address of the Guarantor shall be its *domicilium citandi et executandi* for all purposes in connection with this Guarantee.

SIGNED at _____ on this day of _____ 20____

Witnesses:

1. _____

For: **[insert name of the Guarantor]**

duly authorized and warranting such authority Full Name:

Capacity:

2. _____

For: **[insert name of Guarantor]**

duly authorized and warranting such authority Full Name:

Capacity:

Employer:		Contractor:	
Witness:		Witness:	



C1.3.2 Blasting Indemnity

Given by

*Company Registration No.

Address

a *Company incorporated with limited liability according to the company laws of the Republic of South Africa, *Partnership, *Close Corporation, *Public Company (hereinafter called the Contractor), represented herein by

in his

capacity as the Contractor's

duly authorised hereto by a resolution

of the Contractor dated

a certified copy of which resolution is

attached to this Indemnity.

WHEREAS the Contractor has entered into a Contract with the Johannesburg Water (SOC) Ltd (hereinafter called the Employer) for,

and the Company requires this Indemnity from the Contractor

NOW THEREFORE THIS DEED WITNESSETH that the Contractor does hereby indemnify and hold harmless the Company in respect of all loss or damage that may be incurred or sustained by the Employer by reason of or in any way arising out of or caused by blasting operations that may be carried out by the Contractor in connection with the aforementioned Contract and also in respect of all claims that may be made against the Employer in consequence of such blasting operations, by reason of or in any way arising out of any accidents or damage to persons, life or property or any other cause whatsoever, and also in respect of all legal or other expenses that may be incurred by the Employer in examining, resisting or settling any such claims; for the due performance of which the Contractor binds itself according to law.

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section C2 Pricing Data



THUS DONE AND SIGNED for and on behalf of the Contractor at

_____ on the

_____ day of _____ 20_____ in the
presence of the subscribing

witnesses.

As witnesses

1. _____

2. _____

Signature

Duly authorised to
sign on behalf of

Address

Employer:		Contractor:	
Witness:		Witness:	



C1.3.3 Health and Safety Contract Between Employer and Contractor in Terms of Section 37(2) of The Occupational Health and Safety Act No 85 Of 1993

Written agreement between Johannesburg Water ((Proprietary) Limited (hereinafter referred to as “the Employer) and _____ (hereinafter referred to as “the mandatory”) as envisaged by Section 37(2) of the Occupational Health and Safety Act, No. 85, of 1993 as amended.

I _____
representing

_____ (mandatory) do
hereby acknowledge that

_____ (mandatory) is an employer in its own right and shall be regarded as the employer for purposes of the contract work specified in the body of the principal agreement with duties as prescribed in the Occupational Health and Safety Act, No. 85 of 1993 as amended so as to ensure that all work will be performed or machinery and plant used in accordance with the provisions of the said Act. I furthermore agree to comply with the requirements of the Employer as contained in the Occupational Health and Safety Specification included with the principal agreement and to liaise with the employer should I, for whatever reason, be unable to perform in terms of this agreement.

Signed this _____ day of _____ at _____

Signature on behalf of mandatory _____

Signature on behalf of Employer _____

Compensation Fund Registration No. of mandatory _____

Good Standing Certificate: ☐ yes ☐ no (tick one box)

Employer:		Contractor:	
Witness:		Witness:	



C1.3.4 Health and Safety Contract: General Information

1. The Occupational Health and Safety Act comprises Sections 1 to 50 and all un-repealed regulations promulgated in terms of the former Machinery and Occupational Safety Act No 6 of 1983 as amended, as well as other regulations which may be promulgated in terms of the OHS Act.
2. 'Mandatory' is defined as including an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or user of plant and machinery
3. Section 37 of the Occupational Health and Safety Act potentially punishes employers (principals) for the unlawful acts or omissions of mandataries (contractors) save where a written agreement between the parties has been concluded containing arrangements and procedures to ensure compliance with the said Act by the mandatory.
4. All documents attached or referred to in the above agreement form an integral part of the agreement.
5. To perform in terms of this agreement mandataries must be familiar with the relevant provisions of the Act.
6. Mandataries who utilise the services of their own mandataries (subcontractors) are advised to conclude a similar written agreement.
7. Be advised that this agreement places the onus on the mandatory to contact the Employer in the event of inability to perform as per this agreement. The Employer, however, reserves the right to unilaterally take any steps as may be necessary to enforce this agreement.
8. The contractor shall be responsible for the full and proper implementation of the terms and provisions of the Act and its regulations in the area in which the work is to be undertaken by the Contractor.
9. The Contractor shall be responsible for the well-being, in relation to health and safety, of all persons coming upon or into such area in accordance with that legislation, including the implementation of any directives issued by management of the Employer in this respect.
10. The work to be done is _____
11. The area in which the work is to be conducted is _____
12. The Contractor shall familiarise himself with such area and all risks existing thereon and undertakes to report to the representative of the Employer any hazard or risk to health and safety which arises during the contract work in the area concerned and over which the Contractor may have no control. All necessary and appropriate safety / health equipment shall be issued by the Contractor to all persons working on or coming into the area.

Employer:		Contractor:	
Witness:		Witness:	

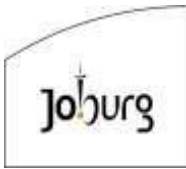


C1.3.4.1 Occupational Health and Safety Indemnity Undertaking

I, the undersigned _____
in my capacity as _____
of the firm _____

1. Hereby undertake to ensure that I/my firm and/or employees and/or subcontractors and/or his employees -
 - 1.1 comply strictly with the provisions of the Occupational Health and Safety Act of 1993 (as amended) and/or the regulations promulgated in terms thereof, with specific reference to section 37(2) of the said act, as well as any relevant legislation, in the course of the performance/execution of any service and/or work in, to or on any of the Employer's buildings, construction sites and/or premises;
 - 1.2 ensure that consultants and/or visitors comply with any instructions and measures relating to occupational health and safety, as prescribed by the Employer; and
 - 1.3 comply strictly with the statutorily prescribed work systems, operational equipment, machinery and occupational health and safety conditions;
2. And as an independent employer and contractor, hereby indemnify, in terms of the above undertakings, the Employer -
 - 2.1 in respect of any costs that I/my firm and/or employees and/or subcontractors and their employees may incur of necessity in compliance with the above undertakings; and
 - 2.2 against any claims that may be instituted against the Employer and/or any liability that the Employer may incur, whether instituted and/or caused by me/my firm's employees, agents, consultants, subcontractors and/or their employees and visitors or the Employer's clients or neighbours in respect of any incidents related to my/my firm's activities and as a result of which the occupational health and safety of the persons involved have been detrimentally affected; and
 - 2.3 against similar claims that I, managers or directors of my firm may have against the Employer and any damages for which I, managers or directors of my firm hold the Employer liable.
3. My firm's compensation commissioner number is _____
and I confirm that my firm and its subcontractors' fees have been paid up and obligations in respect of the compensation commissioner have been complied with and further that I shall furnish proof thereof in writing on request.
- 4.0 I hereby confirm that I have the authority to sign this indemnity undertaking and that the Employer is not obliged to confirm such confirmation.

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1 Tender and Contract
Section C2 Pricing Data



Signed at _____ This _____ day of _____

Signature

Capacity

As witnesses:

1

2

Employer:		Contractor:	
Witness:		Witness:	



Johannesburg Water (SOC) Ltd



CONTRACT JW14289R

**CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD
RESERVOIR**

VOLUME 1

PART 2: PRICING DATA

Employer:		Contractor:		
Witness:		Witness:		

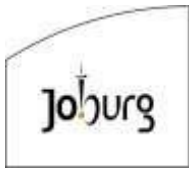
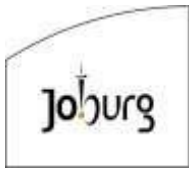


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Employer:		Contractor:		
Witness:		Witness:		

**C2 PRICING DATA****C2.1 PRICING INSTRUCTIONS****C2.1.1 General Preamble to the Bill of Quantities**

- a) **The Contract is to be constructed by maximising the use of labour. In cases where the use of plant is required, the Contractor must motivate and obtain written permission before the work is undertaken with plant. Payment will not be made for unauthorized use of plant to carry out work.**
- b) All items in the Bill of Quantities, except where otherwise specified in Clause 8 of a Standardised Specification or in the Project Specification, shall be measured and shall cover operations as recommended in the standard system of measurement of civil engineering quantities, published under the title "Civil Engineering Quantities", by the South African Institution of Civil Engineering.
- c) The basis and principles of measurement and payment are described in this section (Pricing Instructions) and Clause 8 of each of the Standardised Specifications for Civil Engineering Construction. The applicable SANS 1200 Standardised Specifications are listed in the Scope of Work, Portion 1: Project Specification. Portion 2: comprises the Technical specifications for the works of each discipline in this contract.
- d) Descriptions in the Bill of Quantities are abbreviated and comply generally with those in the Standardised Specifications. Clause 8 of each Standardised Specification, read together with the relevant clauses of the Scope of Work, set out what ancillary or associated activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standardised Specification or the Scope of Work, conflict with the terms of the Bill of Quantities, the requirements of the Standardised Specification or Scope of Work, as applicable, shall prevail.
- e) The clauses in a specification in which further information regarding the Schedule item may be found are listed in the "Payment Refers" column in the Schedule. The reference clauses indicated are not necessarily the only sources of information in respect of listed items. Further information and specifications may be found elsewhere in the Contract Documents. Standardised Specifications are identified by the letter or letters which follow SANS in the SANS 1200 series of specifications, e.g. G for SANS 1200G.
- f) Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.
- g) Cable quantities given in the Schedule of Quantities and Cable Schedules have been measured against scaled drawings. It is the contractor's responsibility to measure the exact cable lengths before purchasing/installing cables. All cables will be subject to re-measure by the Employer's Agent once installed. Furthermore, before any material is purchased, the contractor must obtain the written permission of the Employer's Agent.
- h) The quantities set out in the Bill of Quantities are the estimated quantities of the Contract Works, but the Contractor shall be required to undertake whatever quantities may be directed by the Engineer from time to time. The Contract Price for the completed Works shall be computed from the actual quantities of work done, valued at the relevant unit rates and/or prices.

Employer:		Contractor:		
Witness:		Witness:		



- i) The rates and/or prices to be inserted in the Bill of Quantities are to be the full inclusive prices for the work described under the several items. Such rates and/or prices shall cover all costs and expenses that may be required in and for the execution of the work described, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the documents, as well as overhead charges and profit. Reasonable charges shall be inserted as these shall be used as a basis for assessment of payment for additional work that may have to be carried out.
- j) The units of measurement described in the Bill of Quantities are metric units. Alternatives used are as follows:

mm	=	millimetre	h	=	hour
m	=	metre	kg	=	kilogram
km	=	kilometre	t	=	ton (1000kg)
m ²	=	square metre	No.	=	number
m ² pass	=	square metre pass	sum	=	lump sum
ha	=	hectare	MN	=	meganewton
m ³	=	cubic metre	MN.	=	meganewton-metre
m ³ km	=	cubic metre-kilometre	P Csum	=	Prime Cost sum
l	=	litre	Prov sum	=	Provisional sum
kl	=	kilolitre	%	=	percent
MPa	=	megapascal	kW	=	kilowatt

- k) For the purpose of this Bill of Quantities, where applicable, the following words shall have the meanings hereby assigned to them:

Unit : The unit of measurement for each item of work as defined in the SANS Standard Specification for South African National Standards.

Quantity : The number of units of work for each item.

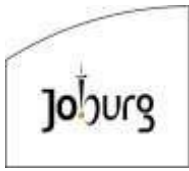
Rate : The agreed payment per unit of measurement.

Amount : The product of the quantity and the agreed rate for an item.

Lump sum: An agreed amount for an item, the extent of which is described in the Bills of Quantities, but the quantity of work of which is not measured in any units.

- l) Arithmetical errors in the Bill of Quantities shall be corrected in accordance with Clause C3.9 of the Conditions of Tender. Should there be any discrepancy between rates and/or prices written in the Assessment Schedule and the Bill of Quantities, the latter shall govern.
- m) A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price/rate is entered will be considered to be a "nil" price/rate and deemed to be covered by the other prices in the Schedule.
- n) The Bill of Quantities shall be completed by hand in INK or TYPED. An electronic version of the BoQ will be made available to all tenderers. Tenderers are permitted to insert rates and prices in the electronic version and submit the completed electronic version of the BoQ as part of their tender pack. Tenderers are to ensure that all line item totals, page totals and summary totals are correct, and will remain fully responsible for the priced BoQ that has been submitted. The Employer will accept no responsibility for any errors or omissions in the priced BoQ.

Employer:		Contractor:		
Witness:		Witness:		

**C2.1.2 Special Payment Conditions**

This clause shall be read in conjunction with the 'Penalties' clause(s). Where the penalty clause shall always receive precedence over this clause, should it be found that duplicative financial corrective measures exist.

C2.1.2.1 Provided Previously

The Contractor shall not re-execute works under this Contract where he has successfully executed works for the Employer under a previous contract(s) that comply with the requirements of this Contract. However, where applicable, the Contractor shall:

- a) clearly state this in his qualifications; and
- b) still provide the associated rates and prices in the schedule in the associated line item, but not calculate an associated amount.

The Employer shall at his sole discretion decide to re-execute such works.

C2.1.2.2 Security

The Contractor shall have been deemed to have included all security related costs in the Provisional and General item rates, including allowing for minimum 100% (high risk areas) of the sites requiring security provision for the Employer and Engineer representative(s).

C2.1.2.3 Materials and Equipment

The Employer shall not provide any works material and equipment, as this shall be provided by the Contractor and deemed to have been included in his provided activity rates or prices.

C2.1.2.4 Permits and Wayleaves

All associated costs to obtain permits and way-leaves as required for the execution of the works, where such affect other services, shall be deemed to have been included in the scheduled rates for SANS 1200A or SANS 1200AA or SANS 1200AB where pricing provision for such items have been allowed for in the pricing schedules, alternatively, it shall be deemed to be included in the various scheduled activity rates or prices provided by the Contractor

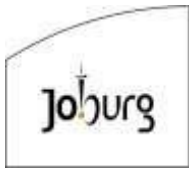
C2.1.2.5 Confined space

The Contractor shall note that work activities shall be executed within confined spaces, and it shall be deemed that allowance has been made in all activity pricing.

C2.1.2.6 Payment ONLY for works completed

The Contractor shall note that payment shall only be made for Works activities successfully (delivering the end result) executed, complying with the quality requirements and provided to the Engineer or his duly authorised representative.

Employer:		Contractor:		
Witness:		Witness:		

**C2.1.3 Health and Safety**

The principal Contractor's health and safety plan has to follow the framework as laid out in the HEALTH AND SAFETY SPECIFICATION AND ENVIRONMENTAL MANAGEMENT PLAN, as a minimum.

No payment shall be applicable where equipment is not provided, and services are not rendered in terms of the approved Health and Safety Plan. Additionally, the Contractor shall also be penalised in terms of Clause (30) of the Occupational Health and Safety Act 183 (1993), Construction Regulations (2014).

C2.1.3.1 Compilation of health and safety plan

Unit: Sum

The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to compile a Health and Safety Plan as per the Health and Safety Specifications contained in Volume 2, and approval of such plan thereof. Remuneration shall be a lump sum.

C2.1.3.2 Implementation of health and safety plan

Unit: Sum

The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to fully comply with the implementation and maintenance of the Health and Safety Plan. Remuneration shall be on a monthly basis for services rendered, by dividing the total sum tendered by the construction duration.

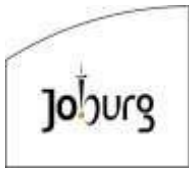
Safety officer

Unit: Sum

The rate shall include the wages and salary that is to be paid to the safety officer/s, whose responsibility it is to ensure that all activities required fully comply with the Health and Safety Plan as per the Health and Safety Specifications contained in Volume 2 for the duration of the Contract. The rate shall be on a monthly basis for services rendered, by dividing the total sum tendered by the construction duration.

NOTE: The Contractor shall clearly state the number of Health and Safety officers in the provided space in the Bill of Quantities that he has allowed for in his price. Where no number is provided the Employer shall assume that adequate provision, minimum one (1) per site, has been made to implement the provided Health and Safety Plan successfully.

Employer:		Contractor:		
Witness:		Witness:		



C2.1.4 EMP Implementation and Maintenance

Unit: Sum

The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to fully comply with the implementation and maintenance of the EMP contained in Volume 2 for the duration of the Contract. Remuneration shall be on a monthly basis for services rendered, by dividing the total sum tendered by the construction duration.

No payment shall be applicable where equipment is not provided, and services are not rendered in terms of the approved EMP.

C2.1.5 Subcontracting

C2.1.5.1

The Contractor shall ensure that rates that are tendered (during Tender Stage) for work items that are likely to be Subcontracted, are market related rates. Provision is made in the Bill of Quantities (BoQ) for the Contractor to add a mark-up for the sourcing, handling, and management of Subcontractors, SMME's, and the like, for the duration of the Contract.

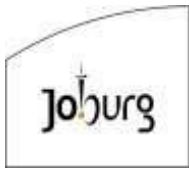
C2.1.5.2

On or during appointment of Subcontractors, should Subcontractors prove that rates, that have been tendered by the Contractor for BoQ work items that are being subcontracted, are not market related, the Contractor will be liable to cover the cost of the difference, i.e. the difference in rate tendered by the Contractor versus the rate that is being requested by the Subcontractor. This difference in cost will be for the Contractor's account, and no Variation Orders for additional costs will be entertained by the Employer. The Contractor bears the full and complete risk for the rates that have been tendered by the Contractor during Tender Stage.

C2.1.5.3

In the event that a rate supplied by the Contractor for a specific BoQ work item is not sufficient to cover Subcontractor costs/rates for that specific item, the Contractor shall provide a detailed rate breakdown for that specific BoQ item (and each and every subsequent BoQ work item where the rate is not sufficient to cover Subcontractor cost); and shall indicate costs (amongst others) for labour, material, handling, mark-ups, etc. to prove that the rate that was submitted during tender stage was in fact market related; and in balance with other rates that were submitted for work items that will not be undertaken by Subcontractors.

Employer:		Contractor:		
Witness:		Witness:		



C2.1.5.4

Should any delays be experienced during the period of the Contract due to the appointment of subcontractors by the Contractor, work stoppages by subcontractors, industrial action by subcontractors, etc. such delays shall be assigned to the Contractor, and no claims for Extension of Time will be entertained by the Employer.

C2.1.6 Recommended Labour-Intensive Tasks (to be used where necessary, with prior approval of the Employer's Agent)

ACTIVITY	TOOLS	TASK
Bush clearing	Axe, saw, rope	Medium dense bush (4 to 7 bushes per 100 m ²) 350 m ² /md Dense bush (10 to 15 bushes per 100 m ²) 200 m ² /md Very dense bush (20 to 30 bushes per 100 m ²) 100 m ² /md
Grass clearing	Slasher, spade, hoe, fork, rake.	Dense grass 85 m ² /md
Stripping ground cover and grubbing out roots, haul to nearby dump and spread	Pick, shovel, fork, rake	Light vegetation, dig to 50 mm deep 150 m ² /md Medium vegetation, dig to 100 mm deep 75 m ² /md Heavy vegetation, dig to 150 mm deep 40 m ² /md
Grubbing out roots to 250 mm deep	Pick, shovel, fork, rake	Dig in soft ground to remove roots 42 m ² /md
Destumping (removal of stumps large roots)	Pick, shovel, axe	Medium dense bush 60 m ² /md
Removal of bush and tree cuttings	Bush hook, rope, axe, saw	Cut, bundle and load branches, tree trunk pieces, other vegetation 8 m ³ /md
Boulder removal	Crowbar	Daily paid
Excavation (measured in place)		Throwing distance: up to 4 4 to 6 m m
Loose soil	Shovel Spade,	5 to 6 m ³ /md 4.5 to 5 m ³ /md
Sticky soil	fork, forked	2 to 3 m ³ /md 1.5 to 2 m ³ /md
Firm soil	hoe Pick,	3 to 4.5 m ³ /md 2.5 to 4 m ³ /md
Hard stony gravel	shovel, spade, hoe	1.5 to 2 m ³ /md 1 to 1.5 m ³ /md
	Pick, shovel, crowba	

Employer:		Contractor:		
Witness:		Witness:		



Contract: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

Volume 1 Tender and Contract



Section C2 Pricing Data

Loading (measured loose) into: Wheelbarrow Trailer Truck	Shovel	Loose soil or gravel: 12 to 15 m³/md 7 to 10 m³/md 4 to 6 m³/md			
Wheel-barrow haul (measured loose; haul and unload only)	Wheelbarrow (Note production increases 30% for good haul route and decreases 30% for poor haul route)	Equivalent haul distance = length + 10(rise + fall) 20 m 40 60 80 100 120 140 160 180 200	Production in loose m3/md over average haul route 4.44 3.16 2.44 2.00 1.70 1.44 1.28 1.15 1.02 0.95		
Levelling roadbed (measured loose)	Shovel, spreader 60 m²/md	60 m²/md			
Picking loose roadbed (bank m³)	Pick, shovel, fork	40 m²/md			
Spreading loose material (loose m³)	Shovel, spreader, hoe	Soil	12 loose m³/md		
		Gravel	10 loose m³/md		
Watering, mixing, spreading and levelling	Shovel, spreader, hoe, string-lines, water bowser	Sandy soil	4.5 m³/md		
		Gravel	3 m³/md		
		(measured tight after compaction)			
Compaction and re-levelling	Roller, string lines, straightedge, shovel, spreader.	Depends upon chosen roller (see below)			
Compaction by pedestrian-controlled double drum vibro-roller	"Stampede" rollers: R75/50 S R90/55 S	Mass kg 980 1 350	Passes 5 4	Layer 100 mm 100 mm	Output 8 m³/h 13 m³/h (tight)
Loosen material in trench with pneumatic tools	Compressor, pneumatic tools, team of 4 people	Intermediate Rock	19 m³ for team 12 m³ for team		
Screen bedding material	Sieve, shovel	7 m³ loose /md			
Offload flat-bed truck or trailer	Shovel	15 m³ loose /md			
Trench backfill, hand compaction	Shovel, spreader, hand-stamper, watering can	Backfill, compact, clean-up and load spoil	4.5 m³/md		
Collecting loose stone	Gloves, wheelbarrows	Up to 20 m 20 to 50 m	2.5 m³/md 2.0 m³/md		
Quarrying, prying out cracked rock	Crowbar, gloves, sledgehammer.	Up to 20 m	0.5 to 1 m³/md		
Rock crushing	New Dawn Engineering hand-	0.25 m³/md (depends on size of feed-stock and size of product)			

Employer:		Contractor:		
Witness:		Witness:		



Section C2 Pricing Data

	turned rock crusher, shovel	
Backfill trench and compact	Shovel, watering can, hand stamper	3.0 m ³ /md
Lay kerbing on level base	Shovel, rubber mallet, string-line, trowel, wheelbarrow	Straight 6.5 to 10.0 m/md Curved 2.0 to 5.0 m/md
Stone pitching: Plain stone pitching Grouted stone pitching Wired and grouted stone pitching	Club hammer, gloves, string-line, shovel, wheelbarrow, stiff broom, pliers, short crowbar	10 to 15 m ² /md, 200 mm thick 6 to 10 m ² /md, 200 mm thick 3 to 5 m ² /md, 200 mm thick
Block paving: placing bedding sand, laying blocks, compacting, joint filling, clean up	Shovel, screed rails and beam, rubber mallet, plate compactor, bass broom, wheelbarrow, gloves	16 to 20 m ² /md
Stormwater drainage pipes: trimming, bedding, laying, backfilling, compaction	Shovel, rake, boning rods, hand stamper, watering can, rope and ground anchors	450 mm dia concrete: 1.2 m/md (needs team of 10) 600 mm dia concrete: 1.0 m/md (needs team of 10) 450 mm dia plastic: 3.5 m/md (needs team of 5)
Concrete base slab: batch, mix, transport, pour and finish off	Batching boxes, wheelbarrow, shovel, screed beam, wood float	0.8 m ³ /md (needs team of 5)
Stone masonry walls	Wheelbarrow, shovel, trowel, club hammer, string line, spirit level, batching box.	1.0 m ³ /md
Gabion work	Gloves, string-line, shovel, wheelbarrow, pliers, short crowbar	1.5 m ³ /md

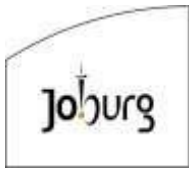
ABBREVIATIONS USED

md = man-day

dia = diameter

Source : Construction Education and Training Authority, Learning Material for Unity Standard 15165: "Use LIC

Employer:		Contractor:		
Witness:		Witness:		



Contract: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

Volume 1 Tender and Contract

Section C2 Pricing Data



C2.2 BILL OF QUANTITIES

Employer:		Contractor:		
Witness:		Witness:		

		Contract: JW14289R CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR Volume 1: Tender and Contract Section C2:Pricing Data					
SECTION 1 : PRELIMINARY AND GENERAL							
ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	SANS 1200A		SECTION 1: PRELIMINARY AND GENERAL				
1.1	8.3		SCHEDULED FIXED-CHARGE AND VALUE RELATED ITEMS				
1.1.1	8.3.1		Contractual Requirements	Sum	1		
	PSAB		Engineer's office for the duration of construction				
1.1.2	PSA 8.3.2.1		Facilities for the Engineer				
1.1.2.1			(a) (i) Engineer's office (15 m²)	Sum	1		
1.1.2.2			(ii) Boardroom (28 m²)	Sum	1		
1.1.2.3			(b)Telephone	Sum	1		
1.1.2.4			(c) Nameboards	Sum	2		
1.1.2.5			(d) Computer Facilities	Sum	2		
1.1.2.6			(e) Carport	Sum	2		
1.1.3	8.3.2.2		Facilities for Contractor				
1.1.3.1			a) Offices and storage sheds	Sum	2		
1.1.3.2			b) Workshops	Sum	1		
1.1.3.3			c) Laboratories	Sum	1		
1.1.3.4			e) Ablution and latrine facilities	Sum	2		
1.1.3.5			f) Tools and equipment	Sum	1		
1.1.3.6			g) Water supplies, electrical power and telecommunication	Sum	1		
1.1.3.7			h) Dealing with water	Sum	1		
TOTAL CARRIED FORWARD							

BROUGHT FORWARD							
1.1.3.8		i) Access	Sum	1			
1.1.3.9		j) Plant	Sum	1			
1.1.4	8.3.4	Removal of site establishment	Sum	1			
1.1.5	PSA 8.3.5	Additional Contractual Obligations					
1.1.5.1	PSA 8.3.5.1	a) Notices and warnings to customers	Sum	1			
1.1.5.2	PSA 8.3.5.2	b) OHS Act Obligations	Sum	1			
1.1.5.3	PSA 8.3.5.3	c) EMP Obligations	Sum	1			
1.2	PSA 8.4	TIME RELATED ITEMS					
1.2.1	PSA 8.4.1	Contractual Requirements	Sum	1			
	PSA 8.4.2	Operate and maintain facilities on site for the duration of construction:					
1.2.2	PSA 8.4.2.1	Facilities for Engineer					
1.2.2.1	PSA8.4.2.1	a) (i)Engineer's office (15 m ²)	Sum	1			
1.2.2.2	PSA8.4.2.1	(ii) Boardroom (28 m ²)	Sum	1			
1.2.2.3	PSA8.4.2.1	(b) Telephone	Sum	1			
1.2.2.4	PSA8.4.2.1	(c) Nameboards	Sum	2			
1.2.2.5	PSA8.4.2.1	(d) Computer Facilities	Sum	1			
1.2.2.6	PSA8.4.2.1	(e) Carport	Sum	2			
1.2.2.7	8.4.2.2	Facilities for Contractor					
1.2.7.1		a) Offices and storage sheds	Sum	1			
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
1.2.7.2		b) Workshops	Sum	1		
1.2.7.3		c) Laboratories	Sum	1		
1.2.7.4		e) Ablution and latrine facilities	Sum	1		
1.2.7.5		f) Tools and equipment	Sum	1		
1.2.7.6		g) Water supplies, electrical power and telecommunication	Sum	1		
1.2.7.7		h) Dealing with water	Sum	1		
1.2.7.8		i) Access	Sum	1		
1.2.7.9		j) Plant	Sum	1		
1.2.8	PSA 8.4.3	Supervision for duration of contract	Sum	1		
1.2.9	PSA 8.4.4	Company and Head Office overhead costs	Sum	1		
1.2.10	PSA 8.4.6	Additional Obligations				
1.2.10.1	PSA 8.4.6.1	(a) OHS Act Obligation (see C2.1.3.1)	Sum	1		
1.2.10.2	PSA 8.4.6.2	(b) Compliance with Environmental Management Plan	Sum	1		
1.2.10.3	PSA 8.4.6.3	(c) Security Services Costs	Month	14		
1.2.10.4	PSA 8.4.6.4	(d) Community Liaison Officer	Month	14		
1.3	PSA 8.5	SUMS STATED PROVISIONALLY BY THE ENGINEER				
1.3.1	PSA 8.5 (b)(1)(i)	Alteration to existing services by authorities	Prov Sum	1	R 130 000.00	
1.3.2	8.5 (b)(2)(i)	Overheads, Charges and profits on item 1.3.1 PSA 8.5 (b)(1)(i)	%	R 130 000.00		
1.3.3	PSA 8.5 (b)(1)(ii)	Control tests by independent laboratory	Prov Sum	1	R 200 000.00	
1.3.4	8.5 (b)(2)(ii)	Overheads, Charges and profits on item 1.3.3, PSA 8.5 (b)(1)(ii)	%	R 0.00		
1.3.5	PSA 8.5 (b)(1)(iii)	Provision of photographic records	Prov Sum	1	R 8 000.00	
TOTAL CARRIED FORWARD						

BROUGHT FORWARD							
1.3.6	8.5 (b)(2)(iii)		Overheads, Charges and profits on item 1.3.5, PSA 8.5 (b)(1)(iii)	%	R 0.00		
1.3.7	PSA 8.5 (b)(1)(iv)		CLO and CSO	Prov Sum	1	R 320 000.00	
1.3.8	8.5 (b)(2)(iv)		Overheads, Charges and profits on item 1.3.7, PSA 8.5 (b)(1)(iv)	%	R 0.00		
1.3.9	PSA 8.5 (b)(1)(v)		Temporary protection of services	Prov Sum	1	R 40 000.00	
1.3.10	8.5 (b)(2)(v)		Overheads, Charges and profits on item 1.3.9, PSA 8.5 (b)(1)(v)	%	R 0.00		
1.3.11	PSA 8.5 (b)(1)(vi)		Pipeline Cathodic Protection and AC Mitigation	Prov Sum	1	R 1 200 000.00	
1.3.12	8.5 (b)(2)(vi)		Overheads, Charges and profits on item 1.3.11, PSA 8.5 (b)(1)(vi)	%	R 1 200 000.00		
1.3.13	PSA 8.5 (b)(1)(vii)		Reinstatement of asphalt by JRA	Prov Sum	1	R 65 000.00	
1.3.14	8.5 (b)(2)(vii)		Overheads, Charges and profits on item 1.3.13, PSA 8.5 (b)(1)(vii)	%	R 65 000.00		
1.3.15	PSA 8.5 (b)(1)(viii)		Supply or hire of specialist equipment	Prov Sum	1	R 50 000.00	
1.3.16	8.5 (b)(2)(viii)		Overheads, Charges and profits on item 1.3.15, 8.5 (b)(1)(vii)	%	R 50 000.00		
1.3.17	PSA 8.5 (b)(1)(ix)		Training of labour	Prov Sum	1	R 405 000.00	
1.3.18	8.5 (b)(2)(ix)		Overheads, Charges and profits on item 1.3.17, PSA 8.5, (b)(1)(ix)	%	R 0.00		
1.3.19	PSA 8.5 (b)(1)(x)		Provision of time lapse photography	Prov Sum	1	R 350 000.00	
1.3.20	8.5 (b)(2)(x)		Overheads, Charges and profits on item 1.3.19, PSA 8.5 (b)(1)(x)	%	R 350 000.00		
1.3.21	8.3.2.2 (xi)		Electric Connection to site by client	Sum	1	R 150 000.00	
1.3.22	8.5 (b)(2)(xi)		Overheads, Charges and profits on item 1.3.21, 8.3.2.2 (xi)	%	R 150 000.00		
1.3.23	8.3.2.2 (xii)		Water Connections to ste by Client	Sum	1	R 40 000.00	
1.3.24	8.5 (b)(2)(xii)		Overheads, Charges and profits on item 1.2.23, 8.3.2.2 (xii)	%	R 40 000.00		
1.3.25	8.3.2.2 (xiii)		Sewer Connections to site by Client	Sum	1	R 40 000.00	
1.3.26	8.5 (b)(2)(xii)		Overheads, Charges and profits on item 1.3.25, 8.3.2.2 (xiii)	%	R 40 000.00		
1.3.27	8.3.2.2 (xiv)		Topographical Survey and Bench marking at the commencement of the project.	Sum	1	R 150 000.00	
1.3.28	8.5 (b)(2)(xiv)		Overheads, Charges and profits on item 1.3.27, 8.3.2.2 (xiv)	%	R 150 000.00		
1.3.29	8.3.2.2 (xv)		Demolition of existing works and disposing	Sum	1	R 650 000.00	
1.3.30	8.5 (b)(2)(xv)		Overheads, Charges and profits on item 1.3.29, 8.3.2.2 (xv)	%	R 650 000.00		
1.3.31	8.3.2.2 (xvi)		Third Party Test of concrete cubes	Sum	1	R 95 000.00	
1.3.32	8.5 (b)(2)(xvi)		Overheads, Charges and profits on item 1.3.31, 8.3.2.2 (xvi)	%	R 95 000.00		

1.3.33	8.3.2.2 (xvii)	Training of local Interns	Sum	1	R450 000.00	
1.3.34	8.5 (b)(2)(xvii)	Overheads, Charges and profits on item 1.3.33, 8.3.2.2(xvii)	%	R 450 000.00		
1.3.35	8.3.2.2 (xviii)	Solar system for Scada, Telemetry and solar backup power supply	Sum	1	R250 000.00	
1.3.36	8.5 (b)(2)(xviii)	Overheads, Charges and profits on item 1.3.35, 8.3.2.2(xviii)	%	R 250 000.00		
1.3.37	8.3.2.2 (xix)	Design, Manufacture, supply and delivery of Solar High Mast Lighting (2) and drawings. Erect complete solar high mast light(s) (2) , inclusive of crane hire, materials and labour and transport.	Sum	1	R40 000.00	
1.3.38	8.5 (b)(2)(xix)	Overheads, Charges and profits 1.3.37, 8.3.2.2(xix)	%	R 40 000.00		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
1.4	PSA 8.7		DAY WORKS			
1.4.1	PSA 8.7.1.2		Allowance for labour	Prov Sum	1	R 300 000.00
1.4.2	PSA 8.7.1.2		Percentage adjustment to item 1.4.1	%	R 300 000.00	
1.4.3	PSA 8.7.1.2		Allowance for material	Prov Sum	1	R 85 000.00
1.4.4	PSA 8.7.1.2		Percentage adjustment to item 1.4.3	%	R 85 000.00	
1.4.5	PSA 8.7.1.2		Allowance for plant	Prov Sum	1	R 90 000.00
1.4.6	PSA 8.7.1.2		Percentage adjustment to item 1.4.5	%	R 90 000.00	
1.4.7	PSSC3		Fixed-Charge items for the sub-contractors Contractual Requirements	Prov Sum	1	R 151 500.00
1.4.8	PSSC4		Overhead, charges and profit for the Main Contractor to provide for fixed-charge items for the sub-contractors Contractual Requirements	%	R 151 500.00	
1.4.9	PSSC5		Time Related items for the sub-contractors Contractual Requirements	Prov Sum	1	R 150 000.00
1.4.10	PSSC6		Overhead, charges and profit for the Main Contractor to provide for time related items for the sub-contractors Contractual Requirements	%	R 150 000.00	
1.4.11	PSSC7		Training for SMMEs	Prov Sum	1	R 350 000.00
1.4.12	PSSC8		Overhead, charges and profit for the Main Contractor to provide for training for SMMEs	%	R 350 000.00	
1.5	PSA 8.8		TEMPORARY WORKS			
1.5.1	PSA 8.8.2		Dealing with traffic and maintain road (or accommodation of traffic)	Sum	1	
1.5.2	PSA 8.8.4		Existing Services			
1.5.2.1	PSA 8.8.4		(a) Supply or hire of specialist equipment	Sum	1	
1.5.2.2	PSA 8.8.4		c) Excavate by hand in soft material to expose existing services	m³	100	
1.5.2.3	PSA 8.8.4		d) Temporary protection of exposed services	sum	1	
1.5.3	PSA 8.8.6		Special water control	Sum	1	
1.5.4	PSA 8.8.7		Dealing with other service authorities, application for wayleaves, etc.	Sum	1	
1.5.5	PSA 8.8.8		Working in close proximity to another contractor on a confined site	Weeks	16	
1.5.6	PSA 8.8.9		Relocation of Unauthorised individuals	Sum	1	
TOTAL CARRIED FORWARD TO SUMMARY						



Contract: JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
Volume 1: Tender and Contract
Section C2:Pricing Data



SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
			SECTION 2: SITE CLEARANCE AND EARTHWORKS (PIPE TRENCHES)				
2.1	SANS 1200 C		Site Clearance				
2.1.1	PSC 8.2.1		Clear and grub	m ²	4122		
2.1.2	PSC 8.2.2		Remove and grub large trees and stumps of girth:				
2.1.2.1			a) over 1m and up to and including 2m	No	4		
2.1.2.2			b) over 2m and up to and including 3m	No	3		
2.1.2.3			c) over 3m, in steps of 1m	No	3		
2.1.3	PSC 8.2.5		Take down existing fences				
2.1.3.1			a) Retaining wall 1.8 m high	m	130		
2.1.3.2			b) Brick wall 2.4 m high	m	60		
2.1.3.3			c) Pre-fabricated wall 2.0 m high	m	5		
2.1.3.4			d) Palisade fence 2.0 m high with electric fence	m	160		
2.1.4	8.2.9		Transport materials and debris to unspecified sites and dump (Provisional)	m ³ .km	1200		
2.1.5	PSC 8.2.11a		Temporary fencing or hoarding				
2.1.5.1			a) Supply, erect and remove temporary five strand barbed wire fences to protect excavations	m	750		
2.1.5.2			b) Supply, erect and remove temporary five strand barbed wire fences to demarcate construction area and limit access by unauthorised individuals	m	100		
2.1.6	PSC 8.2.11b		Removal of man-made surfaces				
2.1.6.1			a) Driveway Asphalt up to 50 mm thickness	m ²	10		
2.1.7	PSC 8.2.12		Backfilling and reinstatement of man-made surfaces				
2.1.7.1	PSC 8.2.12.1		(a) Backfilling and reinstatement of roads	m ²	100		
2.1.7.2	PSC 8.2.12.2		(b) Backfilling and reinstatement footways	m	20		
2.1.8	PSC 8.2.13		Reinstatement of existing masonry walls and steel palisade fences	m ²	120		
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
2.2	SABS 1200 DB		Earthworks (Pipe Trenches)			
2.2.1	PSDB 8.3.1		Site Clearance and (if specified) Removal of topsoil			
2.2.1.1			c) Removal, stockpiling and replacing of Topsoil (300 mm thick)	m³	15	
2.2.2	PSDB 8.3.5		Existing services that intersect or adjoin a pipe trench			
2.2.2.1	PSDB 8.3.5(a)		(a) Services that intersect a trench			
2.2.2.2.1			(i) Sewer pipes up to 600 mm Dia.	No.	2	
2.2.2.2.2			(ii) Stormwater pipes up to 1200 mm Dia.	No.	4	
2.2.2.2.3			(iii) Water pipes up to 500mm Dia.	No	6	
2.2.2.2.4			(iv) Water pipes between 500mm Dia and 1200mm Dia	No	2	
2.2.2.2.5			(v) Electrical Cables	No	12	
2.2.2.2.6			(vi) Fibre Optic Cable	No	7	
2.2.2.2.7			(vii) Telkom Cable	No	5	
2.2.2.2.8			(vii) Overhead electricity lines	No	1	
2.2.2.2	PSDB 8.3.5(b)		(b) Services that adjoin a trench			
2.2.2.2.1			(i) Electrical Cables	m	50	
2.2.2.2.2			(ii) Fibre Optic Cable	m	100	
2.2.2.2.3			(iii) Telkom Cable	m	50	
2.2.2.3	PSDB 8.3.5(c)		(c)Services that require special care (electricity and telecommunication poles)	No	5	
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
2.2.3	8.3.6		Finishing			
2.2.3.1	PSDB 8.3.6.1(d)		Reinstate road surfaces complete with all courses: Brick Paving	m ²	200	
2.2.3.2	PSDB 8.3.6.2		Reinstatement of surfacing for footways	m ²	200	
2.2.3.3	PSDB 8.3.6.3		Reinstate Kerbs and Channels	m ²	100	
2.2.3.4	PSDB 8.3.6.4		Reinstatement of grassed surfaces	m ²	400	
2.2.3.5	PSDB 8.3.6.5		Reinstatement of fence			
2.2.3.5.1			a) Steel palisade fence with brick columns and electric fence	m	150	
2.2.4	PSDB 8.3.8		Form Firebreaks	m ²	50	
2.2.5	PSDB 8.3.9		Discontinue operations unexpectedly and transfer plant, equipment and labour (provisional item)	No. of Transfers	2	
			THE FOLLOWING IS FOR THE EXCAVATION OF A TRENCH FOR A 500 mm ND STEEL PIPELINE: MINIMUM WIDTH - 1300mm JOINT HOLE WIDTH - 1500mm AVERAGE DEPTH TO INVERT - 2.0 m MAXIMUM DEPTH TO INVERT - 3.94m APPROXIMATE LENGTH - 162 m			
	PSDB 8.3.2		Excavation			
2.2.6			Up to 3 m deep:			
2.2.6.1	PSDB 8.3.2(a)		a) Excavate in all materials, for trenches, backfill, compact and stockpile	m ³	360	
2.2.6.2	PSDB 8.3.2(b)		b) Extra-over item (a) above for:			
2.2.6.2.1			1) Intermediate Rock	m ³	10	
2.2.6.2.2			2) Hard Rock	m ³	10	
2.2.6.2.3			3) Hand excavation and backfill where ordered by the Engineer	m ³	20	
2.2.6.2.4			4)Cutting of premix and concrete surfaces	m ²	10	
2.2.6.2.5			5) Backfill stabilised with 5% cement where directed by the Engineer	m ³	10	
2.2.6.2.6			6) Soil-crete backfill where directed by the Engineer	m ³	10	
2.2.6.3	PSDB 8.3.2(c)		c) Excavate and dispose of unsuitable material from trench bottom	m ³	35	
TOTAL CARRIED FORWARD						

BROUGHT FORWARD							
2.2.6.4	PSDB 8.3.2(d)		d) Widening and deepening in all materials, for valve chambers and stockpile	m ³	132		
2.2.6.5	PSDB 8.3.2(e)		e) Extra-over item (d) above for:				
2.2.6.5.1			1) Intermediate Rock	m ³	10		
2.2.6.5.2			2) Hard Rock	m ³	10		
2.2.7			Between 3 m and 4 m deep				
2.2.7.1	PSDB 8.3.2(a)		a) Excavate in all materials, for trenches, backfill, compact and stockpile	m ³	111		
2.2.7.2	PSDB 8.3.2(b)		b) Extra-over item (a) above for:				
2.2.7.2.1			1) Intermediate Rock	m ³	10		
2.2.7.2.2			2) Hard Rock	m ³	10		
2.2.7.2.3			3) Hand excavation and backfill where ordered by the Engineer	m ³	10		
2.2.7.2.4			5) Backfill stabilised with 5% cement where directed by the Engineer	m ³	10		
2.2.7.2.5			6) Soil-crete backfill where directed by the Engineer	m ³	10		
2.2.7.3			c) Excavate and dispose of unsuitable material from trench bottom	m ³	10		
	PSDB 8.3.3		Excavation Ancillaries				
2.2.8	PSDB 8.3.3.1		Make up deficiency in backfill material				
2.2.8.1			a) from other necessary excavations on site	m ³	60		
2.2.8.2			c) by importation from commercial or off-site sources selected by the Contractor	m ³	15		
2.2.8.3			d) 38 mm stone from any source	m ³	20		
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
2.2.8.4			e) Soil for soil cement from any source	m ³	10	
2.2.8.5			f) Crusher run from any source	m ³	10	
			THE FOLLOWING IS FOR THE EXCAVATION OF A TRENCH FOR A 100 mm ND uPVC PIPELINE: MINIMUM WIDTH - 1200mm AVERAGE DEPTH TO INVERT - 1 500 mm MAXIMUM DEPTH - 2 900 mm APPROXIMATE LENGTH - 235 m			
	PSDB 8.3.2		Excavation			
1.3.33						
2.2.9			Up to 3 m deep:			
2.2.9.1	PSDB 8.3.2(a)		a) Excavate in all materials, for trenches, backfill, compact and stockpile	m ³	357	
2.2.9.2	PSDB 8.3.2(b)		b) Extra-over item (a) above for:			
2.2.9.2.1			1) Intermediate Rock	m ³	10	
2.2.9.2.2			2) Hard Rock	m ³	10	
2.2.9.2.3			3) Hand excavation and backfill where ordered by the Engineer	m ³	10	
2.2.9.2.4			4) Backfill stabilised with 5% cement where directed by the Engineer	m ³	10	
2.2.9.2.5			5) Soil-crete backfill where directed by the Engineer	m ³	10	
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
2.2.9.3	PSDB 8.3.2(c)		c) Excavate and dispose of unsuitable material from trench bottom	m ³	20	
2.2.9.4	PSDB 8.3.2(d)		d) Widening and deepening in all materials, for valve chambers and stockpile	m ³	10	
2.2.9.5	PSDB 8.3.2(e)		e) Extra-over item (d) above for:			
2.2.9.5.1			1) Intermediate Rock	m ³	1	
2.2.9.5.2			2) Hard Rock	m ³	1	
	8.3.3		Excavation Ancillaries			
2.2.10	PSDB 8.3.3.1		Make up deficiency in backfill material			
2.2.10.1			a) from other necessary excavations on site	m ³	50	
2.2.10.2			c) by importation from commercial or off-site sources selected by the Contractor	m ³	20	
2.2.10.3			d) 38 mm stone from any source	m ³	50	
2.2.10.4			e) Soil for soil cement from any source	m ³	5	
2.2.10.5			f) Crusher run from any source	m ³	5	
			THE FOLLOWING IS FOR THE EXCAVATION OF A TRENCH FOR A 700 mm ND STEEL PIPELINE: MINIMUM WIDTH - 1500mm JOINT HOLE WIDTH - 1800mm AVERAGE DEPTH TO INVERT - 2.2 m MAXIMUM DEPTH TO INVERT - 2.9m APPROXIMATE LENGTH - 47 m			
	PSDB 8.3.2		Excavation			
2.2.11			Up to 3 m deep:			
2.2.11.1	PSDB 8.3.2(a)		a) Excavate in all materials, for trenches, backfill, compact and stockpile	m ³	155	
2.2.11.2	PSDB 8.3.2(b)		b) Extra-over item (a) above for:			
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
2.2.11.2.1		1) Intermediate Rock	m ³	5		
2.2.11.2.2		2) Hard Rock	m ³	5		
2.2.11.2.3		3) Hand excavation and backfill where ordered by the Engineer	m ³	5		
2.2.11.2.4		4) Backfill stabilised with 5% cement where directed by the Engineer	m ³	5		
2.2.11.2.5		5) Soil-crete backfill where directed by the Engineer	m ³	5		
2.2.11.3	PSDB 8.3.2(c)	c) Excavate and dispose of unsuitable material from trench bottom	m ³	5		
2.2.11.4	PSDB 8.3.2(d)	d) Widening and deepening in all materials, for valve chambers and stockpile	m ³	39		
2.2.11.5	PSDB 8.3.2(e)	e) Extra-over item (d) above for:				
2.2.11.5.1		1) Intermediate Rock	m ³	5		
2.2.11.5.2		2) Hard Rock	m ³	5		
	8.3.3	Excavation Ancillaries				
2.2.12	PSDB 8.3.3.1	Make up deficiency in backfill material				
2.2.12.1		a) from other necessary excavations on site	m ³	40		
2.2.12.2		c) by importation from commercial or off-site sources selected by the Contractor	m ³	20		
2.2.12.3		d) 38 mm stone from any source	m ³	5		
2.2.12.4		e) Soil for soil cement from any source	m ³	5		
2.2.12.5		f) Crusher run from any source	m ³	5		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
			THE FOLLOWING IS FOR THE EXCAVATION OF A TRENCH FOR A 250 mm ND CLASS 16 uPVC PIPELINE: MINIMUM WIDTH - 1 200mm AVERAGE DEPTH TO INVERT - 2 000 mm MAXIMUM DEPTH - 2 500 mm APPROXIMATE LENGTH - 156 m			
	PSDB 8.3.2		Excavation			
2.2.13			Up to 3 m deep:			
2.2.13.1	PSDB 8.3.2(a)		a) Excavate in all materials, for trenches, backfill, compact and stockpile	m ³	375	
2.2.13.2	PSDB 8.3.2(b)		b) Extra-over item (a) above for:			
2.2.13.2.1			1) Intermediate Rock	m ³	50	
2.2.13.2.2			2) Hard Rock	m ³	10	
2.2.13.2.3			3) Hand excavation and backfill where ordered by the Engineer	m ³	100	
2.2.13.2.4			5) Backfill stabilised with 5% cement where directed by the Engineer	m ³	20	
2.2.13.2.5			6) Soil-crete backfill where directed by the Engineer	m ³	10	
2.2.13.3	PSDB 8.3.2(c)		c) Excavate and dispose of unsuitable material from trench bottom	m ³	20	
	8.3.3		Excavation Ancillaries			
2.2.14	PSDB 8.3.3.1		Make up deficiency in backfill material			
2.2.14.1			a) from other necessary excavations on site	m ³	55	
2.2.14.2			c) by importation from commercial or off-site sources selected by the Contractor	m ³	20	
2.2.14.3			d) 38 mm stone from any source	m ³	25	
2.2.14.4			e) Soil for soil cement from any source	m ³	10	
TOTAL CARRIED FORWARD						

BROUGHT FORWARD							
2.2.14.5	SANS 1200 D PSD 8.3.2		f) Crusher run from any source	m³	10		
			EARTHWORKS				
2.2.15			a) Excavate in all materials for trapezoidal drainage channel with depth 1m, bottom width 1 m and top width 2m, dispose and stockpile as ordered by Engineer	m³	280		
2.2.16			b) extra over for intermediate excavation	m³	10		
2.2.17			c) extra over for hard rock excavation	m³	10		
TOTAL CARRIED FORWARD TO SUMMARY							

		Contract: JW14289R CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR Volume 1: Tender and Contract Section C2:Pricing Data					
SECTION 3: MEDIUM PRESSURE PIPELINES							
ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	SANS 1200: L		SECTION 3: PIPELINES				
			THE FOLLOWING FOR 508 mm OD STEEL PIPES, API 5L X42, 6 mm WALL THICKNESS, RIGID POLYURETHANE COATING AND SOLVENT FREE EPOXY LINED, 12.1 m STANDARD LENGTHS				
3.1	PSL 8.2.1		Supply, Lay and bed pipes complete with flanges	m	162		
3.2	8.2.2		Extra-over item 3.1 for the supplying, laying and bedding of specials complete				
3.2.1			a) 2° to 15° (mitred bends)	No	1		
3.2.2			b) 15° to 30°	No	1		
3.2.3			c) 30° to 45°	No	1		
3.2.4			d) 45° to 60°	No	2		
3.2.5			e) 60° to 75°	No	1		
3.2.6			f) 75° to 90°	No	4		
3.3	8.2.5		Supply and place pipes, Valves and Specials complete (Refer to PSL 7.5)				
3.3.1			Drawing No JW14289R-300 (Inlet Flow Meter chamber and installation details)				
3.3.1.1			Item 1: 500 mm x 400 mm ND Reducer	No	2		
3.3.1.2			Item 2: 400 mm ND straight pipe	No	1		
3.3.1.3			Item 3: 400 mm ND straight pipe	No	1		
3.3.1.4			Item 4: 400 mm ND puddle pipe flanged	No	2		
3.3.1.5			Item 5: 400 mm ND flanged spool piece	No	2		
3.3.1.6			Item 7: EMF Flow Meter class 40	No	1		
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
3.3.2		Drawing No JW14289R-304 (Reservoir bypass PRV Chamber Pipe and fitting schedule)				
3.3.2.1		Item 1: Equal Tee	No	2		
3.3.2.2		Item 2: Crotch plate for Tee-piece	No	2		
		Item 3: Long radius bend	No	2		
3.3.2.4		Item 4: 500 mm x 400 mm reducer	No	4		
3.3.2.5		Item 5: Puddle pipe with branch	No	4		
3.3.2.6		Item 6: Gate valve PN40	No	4		
3.3.2.7		Item 7: Flanged spool piece	No	4		
3.3.2.8		Item 8: Flanged spool piece with testing point	No	4		
3.3.2.9		Item 9: Pressure reducing valve PN 40 with pressure transducer	No	4		
3.3.2.10		Item 10: Straight pipe with testing point and flanges each end	No	2		
3.3.2.11		Item 11: 100 mm ND 90 degree bend	No	8		
3.3.2.12		Item 12: 100 mm spool piece flanged	No	4		
3.3.2.13		Item 13: Gate valve PN 40 with insertion flow meter	No	4		
3.3.2.14		Item 14: Spool piece	No	4		
3.3.2.15		Item 15: Spool piece	No	4		
3.3.2.16		Item 16: Steel pipe	No	4		
3.3.2.17		Item 17: Steel pipe	No	2		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
3.3.3		Drawing No JW14289R-306 (Reservoir inlet PRV chamber pipe and fitting schedule)				
		Item 1: Equal Tee	No	1		
3.3.3.2		Item 2: Equal Tee	No	2		
3.3.3.3		Item 3: Straight pipe	No	2		
3.3.3.4		Item 4: Crotch plate	No	2		
3.3.3.5		Item 5: Medium radius bend	No	2		
3.3.3.6		Item 6: Straight pipe	No	4		
3.3.3.7		Item 7: 500 mm x 400 mm reducer	No	4		
3.3.3.8		Item 8: Puddle pipe	No	4		
3.3.3.9		Item 9: Gate valve PN40	No	4		
3.3.3.10		Item 10: straight pipe	No	4		
3.3.3.11		Item 11: Pressure reducing valve PN 40 with pressure transducer	No	2		
3.3.3.12		Item 12: Flanged spool piece	No	4		
3.3.3.13		Item 13: Flanged spool piece with testing point	No	4		
3.3.3.14		Item 14: Pressure reducing valve PN 40 with pressure transducer	No	2		
3.3.3.15		Item 15: Straight pipe with testing point and flanges each end	No	2		
3.3.3.16		Item 16: Reservoir level control valve PN 40	No	2		
3.3.3.17		Item 17: 90 degree bend 100 mm ND	No	8		
3.3.3.18		Item 18: 100mm ND pipe section	No	4		
3.3.3.19		Item 19: Gate valve	No	4		
3.3.3.20		Item 20: Flanged pipe section	No	4		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
3.3.3.21		Item 21: Flanged pipe section	No	4		
3.3.3.22		Item 22: Flow control valves	No	2		
3.3.3.23		Item 23: Crotch Plate	No	1		
3.3.3.24		Item 24: Threaded end cap	No	1		
3.3.3.25		Item 25: Distance piece	No	1		
3.3.3.26		Item 26: HDPE Isolation valve	No	1		
3.3.3.27		Item 27: flange adaptor	No	4		
3.3.3.28		Item 28: Distance piece	No	1		
3.3.3.29		Ultrasonic Level transducer supplied and installed on reservoir roof, complete with 75 m power cable and 75 m data cable	No	1		
3.3.3.30		Submersible altitude level transducer supplied and installed with 10 m power cable and 10 m data cable	No	1		
3.3.4		Drawing No JW14289R-700 (Reservoir inlet details)				
3.3.4.1		Item 1: Stainless steel gooseneck	No	1		
3.3.4.2		Item 2: straight pipe	No	1		
3.3.4.3		Item 3: 27° bend	No	1		
3.3.4.4		Item 4: Straight pipe	No	1		
3.3.5		Drawing No JW14289R-701 (Reservoir outlet details)				
3.3.5.1		Item 1: Stainless steel bellmouth	No	1		
3.3.5.2		Item 2: Straight pipe	No	1		
3.3.5.3		Item 3: bend	No	1		
3.3.5.4		Item 4: Stainless steel trash rack complete with frame	No	1		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
3.3.5.5		Item 5: Insulating gasket kit	No	1		
3.3.6		Drawing No JW14289R-702 (Reservoir overflow details) and Drawing No JW14289R-703 (Reservoir scour and overflow details)				
3.3.6.1		Item 1: Stainless steel trash rack complete with frame	No	1		
3.3.6.2		Item 2: Stainless steel bellmouth	No	1		
3.3.6.3		Item 3: Straight pipe	No	1		
3.3.6.4		Item 4: Equal tee complete with crotchplate	No	1		
3.3.6.5		Item 5: Straight pipe	No	1		
3.3.6.6		Item 6: Short radius bend	No	2		
3.3.6.7		Item 7: Straight pipe	No	1		
3.3.6.8		Item 8: Stainless steel pipe with short radius bend	No	1		
3.3.6.9		Item 9: Stainless steel pipe with puddle flange	No	1		
3.3.6.10		Item 10: Stainless steel bellmouth opening	No	1		
3.3.6.11		Item 11: Stainless steel pipe with puddle flange	No	1		
3.3.6.12		Item 12: Straight pipe	No	1		
3.3.6.13		Item 13: Straight pipe	No	1		
3.3.6.14		Conductivity probe to be installed in overflow pipe	No	1		
3.3.7		Drawing No JW14289R-310 (Typical insulating gasket kit manhole detail)				
3.3.7.1		Item 1: Flange insulating gasket kit, type E	No	2		
3.3.7.2		Item 2: Flanged spool piece	No	4		
3.3.7.3		Item 3: Straight pipe with puddle flange	No	2		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
			THE FOLLOWING FOR 762 mm OD STEEL PIPES, API 5L X42, 6 mm WALL THICKNESS, RIGID POLYURETHANE COATING AND SOLVENT FREE EPOXY LINED, 12.1 m STANDARD LENGTHS			
3.4	8.2.1	Supply, Lay and bed pipes complete with flanges	m	47		
3.5	8.2.5	Supply and place pipes, Valves and Specials complete (Refer to PSL 7.5)				
3.5.1		Drawing No JW14289R-308 (Outlet Flow Meter chamber and installation details)				
3.5.1.1		Item 1: Blank flange	No	1		
3.5.1.2		Item 2: Puddle flange	No	1		
3.5.1.3		Item 3: EMF Flow Meter class 16	No	1		
3.5.1.4		Item 4: Flanged spool piece	No	1		
3.5.1.5		Item 5: Flanged spool piece	No	1		
3.5.1.6		Item 6: Equal tee with crotch plate	No	1		
3.5.1.7		Item 7: Straight pipe	No	1		
3.5.1.8		Item 8: Bend	No	1		
3.5.1.9		Item 9: Reducer	No	1		
3.5.1.10		Item 10: Bend	No	1		
3.5.2		Drawing No JW14289R-309 (Outlet Isolation valve and installation details)				
3.5.2.1		Item IV1: Puddle pipe	No	2		
3.5.2.2		Item IV2: Spool piece	No	1		
3.5.2.3		Item IV3: Spool piece with tee-off	No	1		
3.5.2.4		Item IV4: Gate valve PN 16	No	1		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
3.5.2.5		Item IV5: Pipe with tee-off	No	1		
3.5.2.6		Item IV6: Bend	No	2		
3.5.2.7		Item IV7: straight pipe	No	1		
3.5.2.8		Item IV8: Gate valve PN16	No	1		
3.5.2.9		Item IV9: Spool piece	No	1		
3.5.2.10		Item IV10: Spool piece	No	1		
3.5.2.11		Item 11: Spool piece	No	1		
3.5.2.12		Item 1 (Pipe Work Schedule) distance piece	No	1		
3.5.2.13		Item 2 (Pipe Work Schedule) Stopcock	No	3		
3.5.2.14		Item 3 (Pipe Work Schedule) distance piece	No	1		
3.5.2.15		Item 4 (Pipe Work Schedule) 90deg bend	No	2		
3.5.2.16		Item 5 (Pipe Work Schedule) distance piece	No	1		
3.5.2.17		Item 6 (Pipe Work Schedule) puddle pipe	No	1		
3.5.2.18		Item 7 (Pipe Work Schedule) distance piece	No	1		
3.5.2.19		Item 8 (Pipe Work Schedule) compression fitting	No	1		
3.5.2.20		Item 9 (Pipe Work Schedule) distance piece	No	1		
3.5.2.21		Item 10 (Pipe Work Schedule) gooseneck	No	1		
3.5.3	8.2.13	Valve and hydrant chambers excluding additional excavations measured elsewhere, complete				
3.5.3.1		Stormwater Chamber complete as per drawing JW14289R-202	No	1		
3.5.3.2		Cable duct manhole complete as per drawing JW14289R-205	No	7		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
3.5.3.3		Inlet Flow meter chamber complete as per drawing JW14289R-300	No	1		
3.5.3.4		Reservoir bypass PRV chamber complete as per drawing JW14289R-304 and JW14289R-305	No	1		
3.5.3.5		Reservoir inlet PRV chamber complete as per drawing JW 14289R-306 and JW 14289R-307	No	1		
3.5.3.6		Outlet flow meter chamber complete as per drawings JW13037-308	No	1		
3.5.3.7		Outlet isolation valve chamber complete as per drawing JW14289R-309	No	1		
3.5.3.8		Insulating gasket and bend manhole complete as per drawing JW14289R-701	No	1		
3.5.3.9		Typical insulating gasket kit manhole complete as per drawing JW14289R-310	No	3		
3.5.3.10		Typical stormwater manhole complete as per drawing JW14289R-210	No	4		
		THE FOLLOWING FOR 100 mm ND uPVC PIPES, CLASS 16, 6m STANDARD LENGTHS, SPIGOT AND SOCKET COUPLINGS WITH INTEGRAL SOCKET AND LOCKED-IN RUBBER RING SEAL				
3.6	PSL 8.2.1	Supply, Lay and bed pipes complete with Couplings	m	235		
		THE FOLLOWING FOR 315 mm ND CLASS 16 uPVC STORMWATER PIPELINE, 6 m STANDARD LENGTHS, SPIGOT AND SOCKET COUPLINGS WITH INTEGRAL SOCKET AND LOCKED IN RUBBER RING SEAL				
3.7	8.2.1	Supply, Lay and bed pipes complete with Couplings	m	156		
3.8	PSL 8.2.17	Connect to existing stormwater catchpit	Sum	1		
	SANS 1200 LC	Cable Ducts				
		THE FOLLOWING FOR HDPE UNDERGROUND BURIED CABLE CONDUIT WITH DIAMETER DN 50. CONDUIT TO HAVE A DOUBLE WALLED, CORRUGATED CONSTRUCTION. MINIMUM COVER TO BE 700 MM. MAXIMUM DISTANCE BETWEEN DRAW PITS TO BE 40 M.				
3.9	PSLC 8.2.5	Supply, lay, bed and prove duct	m	740		
3.10	LC 8.2.7	Draw pits / manholes as per drawing JW14289R-205	No	5		
TOTAL CARRIED FORWARD TO SUMMARY						



SECTION 4: RESERVOIR

ITEM No.	PAYMENT	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
			SECTION 4: EARTHWORKS AND STRUCTURAL CONCRETE				
4.1	SANS 1200 DA		EARTHWORKS (SMALL WORKS)				
	PSDA 8.3.1		Excavation				
4.1.2			b) Excavate in all materials to flatten surrounding hills to predetermined level and stockpile material for embankments, or backfill, or dispose as ordered.	m ³	284		
			c) Extra-over for				
4.1.3			1) Intermediate excavation	m ³	556		
4.1.4			2) Hard rock excavation	m ³	740		
4.1.5			3) Boulder excavation, Class A	m ³	370		
4.1.6			4) Boulder excavation, Class B	m ³	185		
	8.3.2		Restricted Excavation				
4.1.7	PSDA 8.3.2 (a)		a) Excavate for restricted foundations, footings and trenches in all materials and stockpile to use for embankments, or backfill, or dispose as ordered	m ³	400		
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
	PSDA 8.3.2 (b)	b) Extra-over item (a) above for:				
4.1.8		1) Intermediate excavation	m³	50		
4.1.9		2) Hard rock excavation	m³	350		
	8.3.3	Overhaul				
4.1.10		a) Limited overhaul	m³	1 112		
4.1.11		b) Long overhaul	m³.km	740		
4.2	SANS 1200 DM	EARTHWORKS (ROADS, SUBGRADE)				
		Treatment of road-bed				
4.2.1	PSDM 8.3.3	2) Road bed preparation and compaction of in-situ material to 93% Mod AASHTO	m²	10		
4.2.2	PSDM 8.3.5	Selected layer compacted to 93% Mod AASHTO	m³	10		
	SANS 1200 G	CONCRETE (STRUCTURAL)				
	8.2	SCHEDULED FORMWORK ITEMS				
	PSG 8.2.1	Rough				
4.3.1		a) Rough vertical plane to curved Reservoir wall, outside footing below ground	m²	131		
4.3.2		b) Vertical plane to overflow pipe base	m²	42		
	PSG 8.2.2	Smooth				
4.3.3		a) Vertical plane to curved walls above ground level (Inside & outside)	m²	3 950		
4.3.4		b) Horizontal plane to roof slab soffit	m²	2 270		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
4.3.5		c) Vertical plane to up stand beam around roof slab	m ²	200		
4.3.6		d) Inclined plane to form shear cone at column heads	m ²	102		
4.3.7		e) Circular vertical plane to 450 mm diameter columns	m ²	901		
4.3.8		f) Vertical plane to column bases	m ²	131		
4.3.9		g) Vertical plane to buttresses	m ²	293		
4.3.10		h) Vertical plane to encasing of over floor pipe	m ²	58		
	8.2.5	Narrow Widths (up to 300 mm wide)				
4.3.11		a) To floor slabs	m	730		
		b) To strip footings in curved plan	m	174		
4.3.13		c) Form 25 mm x 25 mm fillets around all exposed edges	m	809		
4.3.14		d) To upstand beams	m	176		
4.3.15		e) For Geopipes	m	870		
	PSG 8.2.6	Box Out Holes / Form Voids				
		c) Large, circular, of diameter over 0,35m up to and including 0,70 m				
4.3.15		1) Up to and including 0,5m deep	No.	2		
		d) Large, other than circular, of area over 0,1 m ² and up to and including to 0.5 m ²				
4.3.16		1) Up to and including 0,5m deep	No.	8		
	8.3	SCHEDULED REINFORCEMENT ITEMS				
4.3.17	8.3.1	a) High tensile steel bars	t	315.8		
4.3.18	8.3.1	b) Mild steel bars	t	1.9		
	8.3.2	High-tensile welded mesh				
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
4.3.19		a) Ref 617	t	1.0		
		Removal and cleaning and fastening of existing reinforcement				
4.3.20		(i) Floor Slab panels (21 floor panels)	Sum	1		
4.3.21		(ii) Wall footings	Sum	1		
	8.4	SCHEDULED CONCRETE ITEMS				
4.3.21	8.4.2	(i) Blinding layer in class 15/19 concrete, 30 mm thick, steel trowelled finish	m²	2367		
4.3.22		(ii) Blinding layer in class 15/19 concrete, 50 mm thick, steel trowelled finish	m²	2367		
4.3.23		(iii) No fines concrete drainage layer including thickening around geopipes	m³	251		
	8.4.3	Strength Concrete				
4.3.24		b) Grade 25/19 concrete for apron and V-drain	m³	120		
4.3.25		c) Grade 35/19 in reservoir	m³	100		
4.3.26		i) To column and wall footings	m³	144		
4.3.27		ii) Reservoir floor slab	m³	530		
4.3.28		iii) To Reservoir walls & buttresses	m³	760		
4.3.29		iv) To internal columns and column heads (shear cones)	m³	108		
4.3.30		v) To reservoir roof slab	m³	727		
4.3.31		vi) To up stand beam around roof	m³	22		
4.3.32		vii) To encasing overflow pipe	m³	143		
4.3.33		viii) To chambers	m³	60		
	8.4.4	Unformed surface finishes				
		a) Wood-floated finish	m²	571		
4.3.34		i) To top of concrete	m²	571		
		b) Steel-floated finish				
4.3.35		i) To top of foundation inside reservoir and strip footing	m²	195		
4.3.36		ii) To reservoir floor	m²	2 200		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
4.3.37		iii) To reservoir roof	m²	2 300		
4.3.38		iv) To top of reservoir wall	m²	63		
4.3.39		v) To top of roof up stand	m²	41		
	8.5	Joints				
4.3.39		a) Wall construction joint complete as detailed on the drawings	m	1989		
4.3.40		b) Joints between floor panels as detailed on the drawing JW14289R-103				
4.3.40.1		(i) Hypalon Bandage (2mm thick x 250 wide)	m	730		
4.3.40.2		(ii) Non absorbent, close cell polyethylene joint filler	m	730		
4.3.40.3		(iii) 250mm Durajoint PVC external water bar	m	730		
4.3.40.4		(iv) 6mm x 115mm sq dowel (diamond type) @ 1000c/c; 50 mm x 2 mm and dowels	m	730		
4.3.41		c) Joints between floor and wall complete as detailed on the drawings with stainless steel (50 mm x 2 mm) and dowels	m	175		
4.3.42		d) Joint between wall footing and apron slab as detailed on drawing JW14289R-104 and JW14289R-106	m	175		
4.3.43		e) Joint between apron slab and V-drain as detailed on drawing JW14289R-104 and JW14289R-106	m	183		
4.3.44		f) Joints in apron slab at 4.25m centre as detailed on drawing JW14289R-104 and JW14289R-106	m	122		
4.3.45		g) Joints in V-drain at 4.40m centres as detailed on drawing JW14289R-104 and JW14289R-106	m	42		
		Miscellaneous				
4.3.46	PSG 8.9	Testing for watertightness	Sum	1		
4.3.47	PSG 8.10	Cleansing and disinfection	Sum	1		
4.3.48	PSG 8.11	Supply and install under reservoir wall footings 2 No layers of 500µm DPC to form slip joint as per details on drawing	m²	316		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
4.3.49	PSG 8.12	Supply and install roof Thermo insulation as detailed on drawings	m²	2259		
	PSG 8.13	Supply and install:				
4.3.50		(i) 110 mm diameter perforated drain pipe protected with U44 Bidim	m	180		
4.3.51		(ii) 80mm diameter perforated pipe protected with U44 Bidim	m	800		
4.3.52	PSG 8.14	Supply and install geofabric layer, U44 Bidim, between no fines concrete drainage layer and 30mm thick blinding layer	m²	2360		
4.3.53	PSG 8.15	Construct manholes for sub surface drainage as detailed on drawings	No.	22		
4.3.54	PSG 8.16	Supply and install Limitglass bearing strip between wall and roof	m	173		
4.3.55	PSG 8.17	Supply and install 30 No roof weepholes as per drawings	No.	30		
4.4	SANS 1200 GF	PRESTRESSED CONCRETE				
4.4.1	8.2.1	Establishing on site, supply and maintenance of tensioning equipment	Sum	1		
4.4.2	8.2.7.1	Supply and install sheathing and tendons	MN.m	5 800.1		
	8.2.7.2	Supply and install anchorages and couplers to suit tendons				
4.4.3		a) Anchorage at jacking end	MN.m	200.3		
4.4.4	8.2.3.4	Post-tensioning and grouting of items supplied under items 8.2.7.1 and 8.2.7.2	No.	63		
4.4.5	8.2.6	Special tests	Sum	1		
4.5	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)				
4.5.1	PSHA 8.1	a) Manhole cover and frame for reservoir access complete with locking bar and lock	No.	2		
4.5.2	PSHA 8.2	b) Supply and install stainless steel roof ventilators to the reservoir roof as indicated on the drawings	No.	57		
4.5.3	PSHA 8.3	c) Internal ladder to reservoir installed complete as indicated on the drawings	No.	2		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
4.5.4	PSHA 8.4	d) External ladder to reservoir installed complete as indicated on the drawings	No.	2		
		PROVISIONAL SUM				
4.5.5		Provisional Sum for earthing and lightning protection	Prov Sum	1	R41 664.00	
4.5.6		Extra-over provisional sum for overheads and handling	%	R 41 664.00		
4.6	SANS 1200 LE	STORMWATER DRAINAGE				
	8.2.1	SUPPLY AND LAY CONCRETE PIPES FOR CULVERTS				
4.6.1		a) 450mm Diameter: Class 50D with OGEE joints on class B bedding	m	25		
4.6.2		b) 375mm Diameter: Class 50D with OGEE joints on class B bedding	m	45		
4.6.3		c) 300mm Diameter: Class 50D with OGEE joints on class B bedding	m	60		
4.6.4		d) 225mm Diameter: Class 50D with OGEE joints on class B bedding	m	60		
4.6.5	8.2.8	b) Construct storm water catch pits as detailed on drawing JW14289R-110	No.	12		
TOTAL CARRIED FORWARD TO SUMMARY						



Contract: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

Volume 1: Tender and Contract

Section C2:Pricing Data



Johannesburg Water

SECTION 5: BUILDINGS, PAVING, FENCING AND STORMWATER DRAINAGE

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
5			SECTION 5: BUILDINGS, PAVING, FENCING AND STORMWATER DRAINAGE				
			CONSTRUCTION OF THE FOLLOWING STRUCTURES TO BE AS PER ITEMISED BILL				
			Guardhouse, as per Drawing JW14289R-240				
			EARTH WORKS				
	SABS 1200 C		SITE CLEARANCE				
5.1	8.2.1		Clear and Grub	m²	50		
	SABS 1200 DA		EARTH WORKS (SMALL WORKS)				
	8.3		Excavation:				
5.2	8.3.1		a) Remove topsoil to nominal depth of 150 mm, stockpile and maintain	m²	50		
	SABS 1200 G		CONCRETE (STRUCTURAL)				
	8.2		Scheduled formwork items				
5.3	8.2.5		Narrow Widths (up to 200 mm wide):				
5.3.1			a) Sides of roof slab and overhang including drip recess	m	15		
5.3.2			c) Sides of Concrete Surround	m	25		
	8.4		SCHEDULED CONCRETE ITEMS				
	8.4.2		Blinding layer				
5.4			50 mm blinding layer thickness Class 15/19	m³	5		
5.5	8.4.3		Strength Concrete:				
5.5.1			a) Grade 25/19 concrete for aprons	m³	5		
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
5.5.2		b) Grade 25/19 concrete for floor slabs and strip footing	m³	5		
5.5.3		c) Grade 25/19 concrete in roof slab	m³	5		
5.5.4		d) Grade 25/19 concrete for ramps	m³	1		
5.5.5		e) Grade 25/19 concrete for walls	m³	1		
	8.4.4	Unformed surface finishes:				
5.6		b) Steel-floated finish				
5.6.1		Top of roof	m²	15		
5.6.2		Floor Slab	m²	15		
5.7		JOINTS				
5.7.1	8.5	Slip joint between wall and roof slab	m	20		
5.7.2		Installation of two layers of three ply malthoid	m	40		
5.8	PSG 8.18	Brickwork				
5.8.1	PSG 8.18.1	Brick walls (double brick wall)	m²	50		
5.8.2	PSG 8.18.2	Brick reinforcement	m	200		
5.8.3	PSG 8.18.3	Lintels above doors and windows	m	10		
5.8.4		Doors, as specified	No	2		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD							
			Potable Water Pipeline to Guardhouse				
	SABS 1200 DB		EARTHWORKS (PIPE TRENCHES)				
	8.3.2		a) Excavate in all materials for trenches, backfill compact and stockpile				
			Pipes with OD up to 25 mm ND				
			Excavation depth:				
			over and up to				
5.90			0 m 1.0 m	m	25		
	SABS 1200 L		MEDIUM-PRESSURE PIPELINES				
5.10	8.2.1		Supply, Lay, and Bed Pipes Complete with Couplings				
5.10.1			DN 25 mm HDPE PE 100 PN 16	m	25		
5.11	8.2.2		Extra-over 8.2.1 for the Supplying, Laying and Bedding of Specials Complete with Couplings	No	10		
	SABS 1200 LB		BEDDING (PIPES)				
5.12	8.2.1		Provision of bedding from Trench Excavation				
5.12.1			a) Selected granular material	m³	10		
5.12.2			b) Selected fill material	m³	10		
			Sewer Pipeline to Guardhouse				
	SABS 1200 DB		EARTHWORKS (PIPE TRENCHES)				
	8.3.2		a) Excavate in all materials for trenches, backfill compact and stockpile				
			Pipes with OD up to 110 mm ND				
			Excavation depth:				
			over and up to				
5.13			0 m 1.0 m	m	50		
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
5.14	SABS 1200 LB	BEDDING (PIPES)				
5.14.1	8.2.1	a) Selected granular material	m³	20		
5.14.2		b) Selected fill material	m³	20		
	SABS 1200 LD	SEWERS				
5.15	8.2.1	Supply, Lay, Joint, Bed (Class 16) and test pipeline	m	50		
5.16	8.2.2	Extra-over 8.2.1 for Specials	No	10		
5.17	PSA 8.8.7	Application for Water connection	Sum	1		
5.18	PSA 8.8.7	Application for Sewer connection	Sum	1		
5.19	PSA 8.8.7	Application for Electrical connection	Sum	1		
5.19.1		Electrical installation as per Drawing JW14289R-240	Sum	1		
5.19.2		Supply + Lay of cable. 3 Core Armoured Cable 4.0 mm² + Trench + Backfill	m	50		
5.19.3		Connection to Guardhouse Switchbox including electrical compliance certificate	Sum	1		
5.20		Sanitary fittings Supplied and Installed	Sum	1		
		Instrumentation Hut, as per Drawing JW14289R-241				
		EARTH WORKS				
	SANS1200 C	SITE CLEARANCE				
5.21	8.2.1	Clear and Grub	m³	35		
	SANS 1200 DA	EARTH WORKS (SMALL WORKS)				
	8.3	Excavation:				
5.22	8.3.1	a) Remove topsoil to nominal depth of 150 mm, stockpile and maintain	m³	35		
	SANS 1200 G	CONCRETE (STRUCTURAL)				
	8.2	Scheduled formwork items				
TOTAL CARRIED FORWARD						

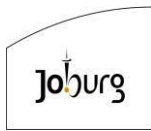
BROUGHT FORWARD						
5.23	8.2.5	Narrow Widths (up to 200 mm wide):				
5.23.1		a) Sides of roof slab and overhang including drip recess	m	9		
5.23.2		c) Sides of Concrete Surround	m	16		
	8.4	SCHEDULED CONCRETE ITEMS				
5.24	8.4.2	Blinding layer				
5.24.1		50 mm blinding layer thickness Class 15/19	m ³	10		
5.24.2		30mm blinding layer thickness Class 15/19	m ³	10		
5.25	8.4.3	Strength Concrete:				
		a) Grade 25/19 concrete for aprons	m ³	5		
5.25.2		b) Grade 25/19 concrete for floor slabs and strip footing	m ³	5		
5.25.3		c) Grade 25/19 concrete in roof slab	m ³	5		
5.25.4		d) Grade 25/19 concrete for ramps	m ³	1		
5.25.5		e) Grade 25/19 concrete for walls	m ³	1		
5.25.6		f) Class B Concrete as Mass Concrete	m ³	20		
	8.4.4	Unformed surface finishes:				
5.26		b) Steel-floated finish				
5.26.1		(i) Top of roof	m ²	5		
5.26.2		(ii) Floor Slab	m ²	5		
		JOINTS				
5.27	8.5	Slip joint between wall and roof slab	m	10		
5.28		Installation of two layers of three ply malthoid	m	20		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
	PSG 8.18	Brickwork				
5.29	PSG 8.18.1	Brick walls (double brick wall)	m³	20		
5.30	PSG 8.18.2	Brick reinforcement	m	150		
5.31	PSG 8.18.3	Lintels above doors	m	2		
		METAL WORK				
5.32		Doors, as specified.	No.	2		
5.33		Electrical installation as per Drawing JW14289R-241	Sum	1		
5.34		Supply + Lay of cable. 3 Core Armoured Cable 4.0 mm² + Trench + Backfill	m	50		
5.35		Connection to Guardhouse Switchbox including electrical compliance certificate	Sum	1		
5.36		50 mm ND uPVC electrical sleeve with draw wire	sum	1		
		PAVING				
5.37	8.2.2	Construction of paving complete using clay paving bricks of size 220 mm x 108.5 mm x 50 mm. Class 35 pavers to be used. Bond pattern to be Herringbone. Colour to be confirmed by Engineer	m²	4406		
5.38	8.2.3	(i) Cutting units to fit edge restraints	m	400		
5.39		(ii) Precast Concrete Barried Kerbs	m	922		
5.40		(iii) Preparation of bedding for paving block , with atleast compatible sand sub-base of atleast 50mm thick.	m²	4406		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD						
		FENCING BOUNDARY WALL FOUNDATIONS NOTES: 1. The foundations have been measured to the natural ground level. Foundation depths shall be confirmed on site. All excavations shall not be covered prior to the approval and recording of the depths by the Structural Engineer.				
	SANS 1200 C	Site Clearance				
5.41	PSC 8.2.1	Clear and grub	m ²	300		
5.42		Remove and grub large trees and stumps of girth:				
5.42.1		a) over 1m and up to and including 2m	No	2		
5.42.2		b) over 2m and up to and including 3m	No	2		
5.42.3		c) over 3m, in steps of 1m	No	2		
5.43	PSC 8.2.5	Take down existing fences				
5.43.1		(a)Take down existing concrete precast wall	m	200		
5.43.2		(b)Transport concrete precast material to nearest Johannesburg Water depot	m ³ .km	960		
5.44		Temporary fencing or hoarding				
5.44.1	PSC 8.2.11a	a) Supply, erect and remove temporary five strand barbed wire fences to demarcate construction area and limit access by unauthorised individuals	m	200		
5.45		PRECAST CONCRETE "Fort Concrete" or equal approved approved precast concrete copping (20 MPA) jointed in 1:3 cement mortar on 230mm walls				
5.45.1		Strip Footing	m ²	50		
5.45.2		Cover blocks and spacers	No.	40		
5.45.3		CAP 290 Concrete wall caps are a solid unit that is put on the top of walls as a finishing stone (LxWxH) (190mmX290mmX50mm)	m	266		
5.46	PS4.2.33.12	Brickwork				
		Approved common bricks laid in 1:4 cement mortar laid in stretcher bond				
5.46.1		Double wall Facebrick	m ²	205		
5.46.2		Double wall stock brick	m ²	380		
		Sundries				
5.47		230mm brickforce	m	1400		
		Plastering and Wall Linings				
5.48		12mm one coat cement/sand plaster with slurry texture finish on wall of faire brick wall	m ²	600		
		Excavations				
	PSDB 8.3.2	Bulk excavation in all materials and dispose as ordered.				
5.49	PSDB 8.3.2(a)	Excavate in all materials and use for backfill or embarkment as ordered. (150mm layers COMPACTED TO 93% MOD.AASHTO)	m ³	200		
5.5	PSDB 8.3.2(b)	Extra over for:				
5.50.1		a) Intermediate excavation.	m ³	3		
5.50.2		b) Hard rock.	m ³	3		
5.50.3		c) Boulder class A excavation.	m ³	3		
5.50.4		d) Boulder class B excavation.	m ³	3		
		REINFORCEMENT				
		Reinforcement steelwork for boundary wall with supplying, cutting, bending, bin ding, placing all complete, with starter bars and stirrups.				
5.51		(i) Y10mm	t	5.4645		
TOTAL CARRIED FORWARD						

BROUGHT FORWARD							
	SABS 1200 DA	EARTHWORKS (SMALL WORKS)					
	8.3	SCHEDULED ITEMS					
	8.3.1	Excavation					
5.52		a) Remove topsoil to nominal depth 150mm, stockpile and maintain	m³	244.8			
	8.3.2	Restricted Excavation					
5.53		Excavate for restricted excavations in footings and use for backfill and compacted to 93% MOD ASHTO	m³	140			
	8.4	SCHEDULED CONCRETE ITEMS					
5.54	8.4.2	f) Blinding layer in class 15/19 concrete, 30 mm thick, steel trowelled finish	m³	124			
	8.4.3	Strength Concrete					
		c) Grade 35/19 in reservoir					
5.55		i) Wall footings	m³	45			
	8.4.4	Unformed Surface Finish					
5.56		d) Top surface of footing painted with 2 layers of bituminous paint	m²	124			
	8.5	JOINTS					
5.57		25mm Bitumen sealed joints	m	240			
		SITE AND SECURITY LIGHTING					
5.58		Design of lighting requirements by a Professional Engineer according to OHS and Johannesburg Water specifications, including installing of required lighting infrastructure, including (but not limited to) masts, LED lights with SABS approval, cabling, ducting and controls	Prov Sum	1		R1 249 897.00	
5.59		Percentage adjustment to item 5.58	%	R 1 249 897.00			
5.60		Supply and install of telemetry equipment as specified by Johannesburg Water	Prov Sum	1		R 416 633.00	
5.61		Percentage adjustment to item 5.60	%	R 416 633.00			
		STORMWATER DRAINAGE CHANNEL					
5.62	SABS1200MK 8.2.7	Trimming of excavation for concrete lined open drain in					
5.62.1		a) Soft material	m³	460			
5.62.2		b) Intermediate material	m³	86			
TOTAL CARRIED FORWARD							

BROUGHT FORWARD						
5.62.3			c) hard material	m ²	29	
5.63	8.2.8		Cast in-situ Concrete Lining for open drain. Concrete 25 Mpa, trapezoidal.	m ³	87	
	8.2.9		Formwork to cast in-situ concrete lining of open drain (smooth surface finish)			
5.64			a) to sides with formwork on the internal face only	m ²	575	
5.65	8.2.10		Sealed joints in concrete lining of open drain	m	200	
5.66	8.2.12		Steel Reinforcement	t	9	
TOTAL CARRIED FORWARD TO SUMMARY						



Contract: JW14289R
CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR
 Volume 1: Tender and Contract
 Section C2:Pricing Data



SUMMARY OF BILL OF QUANTITIES		
SECTION	DESCRIPTION	AMOUNT
SECTION 1	PRELIMINARY AND GENERAL	R
SECTION 2	SITE CLEARANCE AND EARTHWORKS (PIPE TRENCHES)	R
SECTION 3	PIPELINES	R
SECTION 4	RESERVOIR	R
SECTION 5	BUILDINGS AND FENCING	R
SUB-TOTAL 1		R
The above prices are Not Firm. In respect of the total value of work done by approved SMME's at 15% of Sub Total 1 (This total shall include all amounts payable to SMME's, including P&G's) R (A)		%
Allowance as a percentage (maximum 15%) for appointing and handling work done by approved SMME's% (B)		
Sub Total 2 [Handling fees for sub contracting = (A) x (B)]		
Sub Total 3 = Sub Total 1 + Sub Total 2		R
10% Escalations		R
Sub-Total 4		R
10% Contingencies		R
Sub-Total 5		R
PLUS 15% VAT		R
TOTAL TENDER PRICE		R
(Carried Forward to Tender Cover Page)		
TENDERER: _____		
COMPANY: _____		
ADDRESS: _____		
CELL: _____		
SIGNATURE: _____		
DATE: _____		



Contract: JW14289R

CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR



Volume 1 Tender and Contract

Section C2 Pricing Data

Signature Page

TENDERER:	
COMPANY:	
ADDRESS:	
CELL:	
SIGNATURE:	
DATE:	

Employer:		Contractor:		
Witness:		Witness:		

Johannesburg Water SOC Ltd



CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

VOLUME 2A

PART 3: SCOPE OF WORK



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C3 SCOPE OF WORK

PORTION 1: PROJECT SPECIFICATION

PS.1 DESCRIPTION OF THE WORKS

PS.1.1 Employer's Objectives

The primary objective of the project is to provide a reservoir which will provide sufficient storage capacity for the new Woodmead Reservoir water sub-district and ease demand from the Marlboro Reservoir. The additional water storage capacity will support further development and densification in the area.

PS.1.2 Overview of the Works

The work to be carried out under this contract includes the supply of equipment, material and labour for the construction of a new 22 ML reservoir in Woodmead. The following items are also included:

- Inlet and Outlet arrangements, including valves;
- All pipework inside the reservoir site;
- A drainage pipe along Woodmead Drive and connection to an existing stormwater catchpit;
- Reservoir site fencing, security measures and guard house;
- Reservoir site internal roads and stormwater drainage, and
- Reservoir telemetry hut.

PS.1.3 Extent of the Works

The primary activities of the project entail the following:

- Site clearance;
- Traffic control and temporary signage during construction;
- Location, exposing and protection of existing services;
- Site fencing;
- Construction of a guard house, telemetry hut and various valve chambers / manholes;
- Earthworks and excavations;
- Construction of a 22 ML reservoir complete;
- Installation of flanged steel pipes;
- Installation of an uPVC drainage pipe;
- Supply and install relevant pipe fittings and valves;
- Connection of water and sewer services;
- Connection of electricity services;
- Construction of a paved internal road.

The Contractor's obligations shall also include strict compliance with any Environmental requirements and/or reports deemed to form part of this Contract as well as any Occupational Health and Safety requirements.

This description of the works is not necessarily complete and shall not limit the work to be carried out by the Contractor under the Contract. Approximate quantities of each type of work are given in the Schedule of Quantities.

Employer:		Contractor:	
Witness:		Witness:	



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PS.1.4 Location of the Works

The new reservoir will be constructed on the site adjacent to the Pikitup depot on the corner of Woodmead Drive and Woodlands Drive (accessed from Jessica Close) in Johannesburg. Please see drawing JW14289R-001 for the location of the reservoir site.

PS.1.5 Temporary Works

The Contractor shall, as relevant:

- a) provide temporary drainage works, temporary pumps and other equipment as might be necessary for the protection, draining and dewatering of the works; and
- b) construct and maintain haulage, temporary access and construction roads, subject to the approval of the Employer, and permit the Employer, other Contractors, statutory bodies or any other person who might require legitimate access to or through the site for the purpose of executing legitimate business, free and unhindered usage of such roads.
- c) temporary water connections, Contractor's offices, storage sheds, latrines, barricading of Works shall be located in an approved position and subject to the approval of all authorities concerned.
- d) Safety and security of the Contractors' temporary works shall be at the Contractors' discretion, but always in accordance with stipulated Occupational Health and Safety requirements.
- e) The camp shall be adequately guarded during or outside working hours.
- f) include the works required to locate, verify and protect existing services within the works area;
- g) be such to ensure no or limited interruption to vehicular and pedestrian traffic; and
- h) be such that existing stormwater flow shall not be impeded during survey and construction activities.

Further the Contractor shall note that no stockpiling of materials, plant, excavated material or any other construction related infrastructure shall be allowed in locations that may interfere with the operations of the Employer and the public in general.

Employer:		Contractor:	
Witness:		Witness:	



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PS.2 ENGINEERING

PS.2.1 Employer's Design

When and where specific reference is made or preference given to specified equipment, should the Contractor fail to comply with these requirements, this may lead to the disqualification of the tender submitted.

Contractors are free to propose alternative mechanical equipment (provided a main offer is submitted to specification) to that proposed by the Employer's Agent and, provided that drawings with details of each alternative proposal are submitted with the Tender, such alternative proposals will be considered in the adjudication of each Tender.

Any alternative mechanical equipment offered shall include all the necessary civil, mechanical, and electrical costs necessary for a complete working system.

The cost of any changes to the Engineer's design will be for the Contractor's account where full details of the changes were not submitted with the tender.

Contractors shall satisfy themselves that the layouts as proposed by the Employer's Agent suit in all respects the equipment proposed by the Employer's Agent or by the Contractor as the case may be. Where equipment other than that proposed by the Employer's Agent is accepted, it will be the sole responsibility of the Contractor to ensure that the associated equipment including pipe work is compatible with the accepted material and proposed structures.

In the case of the Employer's Agent's acceptance of an alternative proposal, the Contractor shall submit in triplicate to the Employer's Agent for his approval, detailed working drawings of the Contractor's alternative design proposal before any related work is executed.

An extension of Time for Completion of the Contract due to time spent on the alteration of the tender drawings to suit the Contractor's alternative proposals or, due to time spent in obtaining the Employer's Agent's approval of such alternatives, shall not be considered.

Acceptance of an alternative proposal or offer shall not relieve the Contractor of any of his obligations in terms of the Contract. The Contractor's cost of preparation and submission of an alternative proposal shall be deemed to be included in the rates tendered for the execution of the Work.

PS.2.2 Drawings

PS.2.2.1 Tender Drawings in Volume 3

Drawings are included in Volume 3 of this Contract Document based on current available information. Such drawing may be updated (based on actual site situation uncovered during execution of the works) and re-issued during the Contract Period as required.

Drawings include:

- a) Locality plans.
- b) Layout drawings.
- c) Longitudinal profiles, and
- d) Typical construction details.

Employer:		Contractor:	
Witness:		Witness:	



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PS.2.2.2 Construction drawings

Upon receiving the instruction to commence with construction, the Contractor shall receive 4 sets of construction drawings, of which 1 set shall be designated for as-built records and updated by the Contractor on a daily basis. The drawings shall be submitted to the Employer's Agent with the Contractor's request for issue of the Practical Completion Certificate.

PS.2.2.3 Shop drawings

Where an item to be supplied in conformance with this Contract Specification has not been designed by the Employer's Agent or Employer, the Contractor shall be required to supply the Employer's Agent with 3 copies of detailed shop drawings prior to delivery of materials, including an electronic copy in drawing format that is compatible with the software packages (AutoCAD or .dxf) used by the Employer's Agent and/or Employer. Only on approval of such shop drawings or an amended version thereof, shall the Contractor proceed with the manufacturing, supply and installation of the designed item.

PS.2.3 INFORMATION SUPPLIED BY EMPLOYER

Certain information contained in these Contract Documents, or provided separately, is being offered in good faith. However, in the circumstances pertaining to the type of information supplied, no guarantee can be given that all the information is necessarily correct or representative. More specifically this applies to all material surveys and reports and similar information, the accuracy of which is necessarily subject to the limitation of testing, sampling, the natural variation, of material or formations being investigated and the measure of confidence with which conclusions can be drawn from any investigations carried out. It also applies to the positions of existing services as indicated on the drawings and to cost estimates provided.

PS 2.4 DESIGN SERVICE AND ACTIVITY MATRIX

- a) The Employer is responsible for the design of the permanent Works as reflected in the Contract Document unless otherwise stated.
- b) The Contractor is responsible for the design of the temporary Works and their compatibility with their permanent Works.
- c) The Contractor shall supply all details, on marked up drawings, necessary to assist the Engineer in the compilation of the As Built drawings.

Employer:		Contractor:	
Witness:		Witness:	

**PS.3 PROCUREMENT****PS.3.1 Preferential Procurement Procedures**

The Contractor's attention is drawn to the following returnable schedules contained in Part T2:

- (a) Empowerment and Preferential Procurement (JW10); and
- (b) Enterprise Declaration Affidavit (to be endorsed by a Commissioner of Oaths) (JW11).

These schedules contain all requirements with regard to preferential procurement.

PS.3.2 Sub-Contracting**PS.3.2.1 Definitions**

Unless inconsistent with the context in these specifications, the following terms, words or expressions shall have the meanings hereby assigned to them:

1. Start-up Enterprises

An enterprise that has been in existence and operating for less than two years.

2. Small Enterprises

An enterprise that has a CIDB grading designation of 1 or 2.

3. Micro Enterprises

An enterprise that has a CIDB grading designation of 3.

4. Locally based SMMEs

Enterprises that have their operational base in the ward in which the project is to be executed or, alternatively, the members of the enterprise are resident in the particular ward. Should a suitable locally based SMME as defined above not be available in the particular ward, then they shall be sourced from adjacent wards.

5. Contract Participation

Contract Participation in terms of this contract is a process by which the Employer implements Government's objectives by setting a target relating to small Contractor development which the Contractor shall achieve as a minimum.

6. Contract Participation Goal (CPG)

Contract Participation Goal is the monetary value of the target set by the Employer in the Contract Participation process.

7. Contract Participation Performance (CPP)

Contract Participation Performance is the measure of the Contractor's progress in achieving the CPG.

The commitment of the Employer to Government Policy concerning the empowerment of the SMMEs shall be noted and adhered to by the Contractor. It is against this background that Johannesburg Water has made provisions under this contract to ensure that the Contractor impart skills to the SMME within the project area during the project implementation.

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The onus is upon the Contractor to handle and manage the procurement process of the Sub-Contractors and once appointed, should be dealt with in accordance with the provisions of Clause 4.4 of the General Conditions of Contract 2015.

The Contractor shall obtain the written approval of the Employer's Agent before appointing any Sub-Contractor. The Contractor shall be solely responsible for the supervision of and payments to such a Sub-Contractor(s) and the approval of a Sub-Contractor by the Employer's Agent shall not indemnify the Contractor from any of his liabilities in terms of the Contract.

PS.3.2.2 Applicable Legislation

The following Acts, as amended from time to time, are predominant amongst those which apply to the construction industry and are listed here for reference purposes only:

- The Constitution of South Africa;
- Preferential Procurement Policy Framework Act No. 5 of 2000;
- Construction Industry Development Board Act No. 38 of 2000;
- Broad-Based Black Economic Empowerment Act No. 53 of 2003.

PS.3.2.3 Scope

The City of Johannesburg has identified job creation and access to procurement opportunities by Start-ups, Small and Micro enterprises (SMMES) as an essential requirement towards building an economically viable City.

This tender is subject to the sub-contracting condition as described in item T2.3.2.7 of the Tendering Procedures and must be adhered to by the main contractor. It is also the obligation of the main contractor to impart skills to the subcontractor/s on the project during implementation. Although a minimum of 15% of the contract value has been identified for this project, the contractor may increase this percentage at his discretion.

The scope of work to be subcontracted will be identified by the main contractor while adhering to all JW SOP and maximum 30% threshold of SMMES employment:

NB: all sub-contractors appointed on this contract must comply with the Central Supplier Database (CSD) requirements, i.e. they must be registered on the CSD.

It is a condition of this contract that the Contractor is required to sub-contract a maximum value of work to **SMME** equal to **30%** of the Contract Sum.

The Contractor is to allow for fortnightly certificates from the SMMEs and for payment to the SMMEs to be effected within 7 days of certification. In order to achieve the goals of this policy and to ensure that the SMMEs are treated fairly and given every opportunity to advance their business whilst delivering a successful project, the Contractor is to note the following and provide for any cost that may be associated therewith.

1. The Contractor shall subcontract the local SMME works .
2. The Contractor will be expected to have clearly specified the programme dates to the SMME and these dates are to be included in the contractual agreement between the two parties. The Contractor is to monitor the SMME's progress against the programme and hold progress meetings with the SMME contractors where minutes are to be kept and signed off by both parties.

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3. Before site establishment, the Contractor will provide each appointment letter and contractual agreement that the Contractor engages with for each SMME on this Project. The Agreement must include agreed work values agreed upon with the Contractor and SMME.
4. Before site establishment, the Contractor will provide the following for all SMMEs:
 - a) SMME company registration
 - b) SMME CIDB proof of registration.
5. The Contractor is to assess the skills of the SMME and provide the relevant support and training for the SMME to complete the works to programme, budget and specification. The Contractor will be expected to provide training to the SMME that will ensure that the SMME's staff is suitably trained to execute the works and that they receive sufficient relevant experience on the project.
6. The Contractor is responsible for safety compliance on the project and will assist the SMME Contractors in all aspects to achieve safety compliance, that will include:
 - a) Assisting the SMME with developing their safety files, legal appointments, etc.
 - b) Assisting the SMME with achieving safety on site.
 - c) Having toolbox talks with the SMME Contractor's employees on a daily basis.
 - d) Providing all safety equipment and signage.
 - e) Providing safety training where necessary.
7. The Contractor is to provide all the necessary equipment for the timeous monitoring and the checking of the quality of works as carried out by the SMME. The Contractor will be expected to monitor the SMME's works for quality compliance and provide all the necessary support to the SMME in order to achieve quality requirements. The Contractor is to ensure that if the SMME's quality of works does not achieve specification, the Contractor will assist the SMME to achieve specification and not allow the works to continue until the quality requirements are achieved.
8. The Contractor is to generate monthly reports for the Johannesburg Water SOC. which includes the following:
 - a) Per SMME: resources on the site, i.e. supervisors, labour, plant tools and equipment
 - b) Per SMME: progress of works on site.
 - c) Per SMME: quality control on site.
 - d) SMME expenditure on the project versus target expenditure including payment progress
 - e) Copies of minutes of the SMME and Contractor progress meetings.
 - f) Concerns and improvements to be made.
 - g) Items listed in PS 5.10
9. In the execution of the Subcontract Work, the Contractor shall ensure that the Sub-Contractor(s) comply with all relevant legislation and regulations including, but not confined to, the Occupational Health and Safety Act. The Contractor hereby indemnifies the Employer against any loss, damage, or claim for Subcontract Works arising out of the former's failure to comply with instructions issued to him in regard to these requirements.

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10. The Contractor shall be required to adopt labour intense construction techniques through the allocated work in the relevant sections of the Bill of Quantities with the proviso that the Employer's specific objectives regarding time and quality are not compromised. Maximisation of employment shall be the aim on this contract.
11. Together with their tenders, all Contractors are required to submit a comprehensive implementation plan clearly stating the labour content and number of jobs that shall be created. The employment of labour shall be reflected in a programme in sufficient details to enable the Project Manager to monitor and compare it with the implementation plan.
12. The Contractor shall be required to submit employment data on a monthly basis to the Employer's Agent.
13. Contractors are to also note that it is an explicit condition of this Contract that all unskilled labourers on the project are to be employed from the local community. The Contractor shall, in general, maximise the involvement of the local community.

PS.3.2.4 RETENTION MONIES

The Employer will deduct Retention money for the overall works including the Subcontract Work at the percentage stated in the Contract Data.

PS.3.2.5 RESOLUTION OF DISPUTES

Should any dispute between the Contractor and the Subcontractor arise out of the provisions of the Subcontract, or the execution of the Subcontract Work, every effort shall be made by the Parties to resolve the matter themselves without the intervention of the Employer. The agreement signed between the contractor and sub-contractor should state dispute resolution procedure and also address late payment issues should it arise.

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PS.4 CONSTRUCTION

PS.4.1 Applicable Standards

PS.4.1.1 National standards

The Standardised Specifications for all associated civil work applicable to this Contract shall be:

SANS	Description
28	: Metal ties for cavity walls (1986)
227	: Burnt clay masonry units (2007)
282	: Bending dimensions and scheduling of steel reinforcement for concrete (2004)
523	: Limes for use in building (2007)
558	: Cast iron surface boxes and manhole and inspection covers and frames (1973)
674	2008
920	: Steel bars for concrete reinforcement (2005)
1024	: Welded steel fabric for reinforcement of concrete (2006)
1083	: Aggregates from natural sources - Aggregates for concrete (2006)
1090	: Aggregates from natural sources - Fine aggregates for plaster and mortar (2002)
1200 A	: General (1986)
1200 AB	: Employer's Agent's office (1986)
1200 C	: Site clearance (1980)
1200 D	: Earthworks (1988)
1200 DB	: Earthworks (Pipe trenches) (1989)
1200 DK	: Gabions and Pitching (1996)
1200 G	: Concrete (Structural) (1982)
1200 GA	: Concrete (Small works) (1982)
1200 GE	: Precast Concrete (1984)
1200 L	: Medium-pressure pipe lines (1983)
1200 LB	: Bedding (Pipes) (1983)
1200 LC	: Cable ducts (1981)
1200 LF	: Erf connection (water) (1983)
1200 LG	: Pipe jacking (1983)
1200 DM	: Earthworks (Roads, Subgrade) (1981)
1200 LD	: Sewers (1982)
1491-1	: Portland cement extenders Part 1: Ground granulated blast-furnace slag (2005)
1491-2	: Portland cement extenders Part 2: Fly ash (2005)
1491-3	: Portland cement extenders Part 3: Silica fume (2005)
1882	: Polymer concrete surface boxes, manhole and inspection covers, gully gratings and frames (2003)
50197-1/	: Cement - Part 1: Composition, specifications and conformity criteria for common EN 197-1 cement
5831	: Presence of chlorides in aggregates
5861-2	: Concrete tests - Sampling of freshly mixed concrete (2006)



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- 5862-1 : Concrete tests - Consistence of freshly mixed concrete - Slump test (2006)
5863 : Concrete tests - Compressive strength of hardened concrete (2006)
5864 : Concrete tests - Compressive strength of hardened concrete (2006)
5865 : Concrete tests - The drilling, preparation, and testing for compressive strength of cores taken from hardened concrete (1994)
0268-1 : Welding of thermoplastics – Welding Processes
1476:2009 : Fabricated flanged steel pipework

Reference is made to certain provisions of:

SANS 1921-5 : Construction and management requirements for works contracts: Earthworks activities which are to be performed by hand

SANS 1914-5 : Targeted construction procurement: Participation of targeted labour

These Specifications are not issued with this volume but are available at the Contractor's expense from: South African National Standards. The Contractor shall be in possession of these Technical Specifications and shall keep a hard copy of the specifications on site for reference by him and the Employer's Agent for the duration of the Contract

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PS.4.1.2 Other Standards

Other Standard Specifications applicable water tank design, to this Contract shall be:

- a) ASTM C.309 Type 1 (Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete)
b) WRC MSCC
c) City of Johannesburg Metropolitan Municipality, Public Road and Miscellaneous By-laws, Code of Practice for work in the road reserve (COP), Latest Version. NOTA BENE: Should any requirement of this COP conflict with any requirement of the standardised or particular specifications the requirements of the COP shall prevail. The COP is available at Johannesburg Roads Agency Offices, Wayleaves Department, Contact number: (011) 298 5000.

PS.4.2 Particular Generic Specifications

PS.4.2.1 Minimum health and safety requirements

This section of the specifications is to be read in conjunction with the Contract Health and Safety specifications, included as Volume 2. The following requirements shall be deemed minimum

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compliance requirements to ensure the health and safety of the public and workers during the execution of the Contract:

PS4.2.1.1 Road safety equipment

The internal conduit survey unit shall be provided with:

- a) an amber-flashing beacon, which shall comply with and be operated in accordance with any governing road vehicle lighting regulations or similar.
- b) appropriate sized and quantity of road signs, including delineators and cones which shall be displayed at the works area in accordance with safety regulations or similar.
- c) bright coloured overalls, fluorescent over-jackets and belts for each team member for use at all working times during the day or night.

PS4.2.1.2 Personal safety equipment

The internal conduit inspection unit shall be provided with:

- a) oxygen deficiency and gas detector apparatus, which shall be regularly serviced and operable.
- b) fresh air breathing apparatus, face mask and demand valve, with a sufficient minimum compressed air supply, determined by the duration of manhole and/or conduit entry.
- c) an approved full vertical lift safety harness.
- d) personal equipment per member:
 - i) safety helmet;
 - ii) safety boots;
 - iii) sewer wading boots; and
 - iv) disposable protective gloves.
- e) First Aid Kit suitable to cater for the number of team members.
- f) facilities for washing, including:
 - i) soft soap;
 - ii) disinfectant; and
 - iii) clean water.
- g) radio equipment and cellular phone for on-site and emergency communication.
- h) fire extinguisher.

PS4.2.2 Traffic control

- a) A traffic control plan shall include detailed diagrams showing the location of all traffic control devices and the length of time for all lane closures, as well as location of any flaggers, as necessary.
- b) One lane of traffic in each direction must be maintained at all times and local streets may only be closed with prior approval of the Employer's Agent.
- c) A written method of handling traffic for each different phase of the project shall be submitted and include both vehicular and pedestrian traffic.
- d) The name and number of the Contractor representative responsible for traffic control shall be made available to solve traffic problems at each job site location.

PS4.2.3 Metric measurement

All survey recorded dimensions of infrastructure shall be in metric units, including for conduits, chambers and manholes.

PS4.2.4 Site preparation

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Prior to any Works commencement the Contractor shall photograph or video tape entire work area. One copy of which shall be given to the Employer's Agent's authorized representative and one copy shall remain with the Contractor for a period of 12 months following the issue of a Completion Certificate. This record shall be used to establish accountability for damages during the execution of the Contract.

No alterations beyond what is required for Works are to be made. Contractor shall confine all activities to designated work areas, to the absolute minimum required.

PS4.2.5 Pipe handling and storage

Pipe shall be handled and stored in accordance with safe lifting practice. The lifting capacity of the equipment shall not be exceeded.

Where slings are used for lifting.

- a) timber, timber wedges or sand bags. Pipes shall be placed on timber bearers not more than 1.5m apart. Where pipes are stacked, timber bearers shall be placed between each layer of pipes.
- b) Plastic pipes shall be stored away from contact with chemicals or ground contaminated with chemicals.
- c) Care shall be taken to prevent scoring and scratching of plastic pipes.

PS4.2.6 Inspection of pipes and fittings

Pipeline rehabilitation components shall be checked for damage and flaws immediately before installation, where:

- a) plastic pipes and fittings shall be checked for gouges, cracks, holes, flattening and indentations.

Damaged or flawed pipes and fittings can only be used if approved by the Employer's Agent. Pipes and fittings considered unsuitable for use by the Employer's Agent shall be removed from the site at the Contractor's expense. The Employer's Agent may approve the repair of any damage where the pipe or joint may be repaired without affecting its performance.

PS4.2.7 Cutting of pipes

Pipes shall at all times be cut square to the barrel of the pipe. For:

- a) rubber ring and solvent cement jointed pipe, the deviation from square shall not be in excess of 5mm.
- b) butt or electro-fusion jointed PE pipes the deviation from square shall not be in excess of 1mm.

Jagged edges shall be removed from pipe ends. Cut edges of rubber ring or solvent cemented plastic pipes shall be beveled in accordance with the manufacturer's instructions.

PS4.2.8 Acceptability of damaged pipe

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Cuts or gouges that reduce the pipe wall thickness in excess of 10% is not acceptable and shall be cut out and discarded.

PS4.2.9 Pipe joining

PS4.2.9.1 Fusion butt-welding

a) Interpretation

This section shall cover the butt-welding plastic pipes, which shall involve the heating of two pipe ends to fusion temperature and then subsequently joining the two ends by the application of force.

b) Equipment

The basic parts of the equipment shall be:

- i) Planning Tool: used to face pipe ends.
- ii) Heating Plate: used to melt pipe ends
- iii) Frame: holds on to the pipes to be joined. It has hydraulic cylinders which apply pressure to the pipe joints.
- iv) Hydraulic unit: has the hydraulic pump, tank, pressure gauges, directional valves, pressure regulation valves.
- v) Data logger: records pertinent process data such as time, pressure and temperature. The data logger ensures that every joint is made properly.

c) Site preparation

The technician shall ensure that the machine is situated in a dry area, before welding is commenced. The equipment shall not be exposed to rain.

No welding shall be executed during rain, unless an outdoor roofing structure is provided to protect the equipment and process from rain. The technician shall ensure that the equipment does not sit on wet ground.

d) Pipe preparation

Pipe ends to be joined shall be dry and free from foreign particles.

PS4.2.9.2 Restrained joint couplings

- a) Pipe may be joined using non-metallic restrained type couplings. Pipe and couplings shall be designed as an integral system and shall be provided by a single manufacturer for maximum reliability and interchangeability. No external pipe-to-pipe restraining devices that clamp onto or otherwise damage the pipe surface as a result of point-loading shall be permitted.

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- b) Couplings shall be designed as minimum for use at the rated pressures of the pipe with which they are utilized.

PS4.2.9.3 Electrofusion belt jointing

- a) The appearance of electrofusion belt shall meet the following requirements:
- (i) The surface of the electrofusion belt shall be smooth and free from cavity, impurity or other defects that may have adverse effect on its function.
 - (ii) The heating wire shall be well embedded into the polyethylene and shall be free from breakage and short circuit
 - (iii) Electrofusion belt side shall be cut properly
 - (iv) The electrofusion belt shall be normally black, other colour is allowed when agreed upon by the Client and supplier.
- b) The dimension and tolerance on dimension of the electrofusion belt shall comply with Table below

ID	Minimum Length L(mm)	Width W (mm)	Tolerance on width (mm)	Thickness (mm)	Tolerance on thickness (mm)	Width of heating wire mesh W1 (mm)	Tolerance on width of heating wire mesh (mm)
800	2712	300	+/-10	7	+/-2	100	+/-8
900	3026	300	+/-10	7	+/-2	100	+/-8
1000	3340	300	+/-10	7	+/-2	100	+/-8

c) Pipe jointing procedure (Electrofusion belt)

- Place two pipes butt to butt and align them to make the axes of the two pipes as close as possible.
- Put the electrofusion belt into the pipes at the jointing position and use electrofusion belt holder to push the electrofusion belt onto the inner wall of the pipes. The overlapping edge and the heating wire terminals shall be positioned at pipe top. The belt shall be equally shared by the two pipes in terms of length.
- Fill in the space at the overlapping part of the belt with profile modelling PE wedge.
- Use the electrofusion belt holder to push the electrofusion belt against the pipe wall and make spacing between electrofusion belt and the pipe as less

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as possible. All pressing shoes of the belt holder shall press and the belt uniformly and soundly.

- 5 Connect the welding control box to the heating element terminal of the electrofusion belt and apply current according to pipe manufacture's technical manual. The specification for current value and the voltage applying time shall be strictly followed. During welding, the current is allowed to decrease continuously and steadily; abrupt decrease or increase of electrical current is not allowed. The surface temperature of the welding zone of the belt shall be uniform along circumference. Careful inspection shall be conducted on the joint when abnormal phenomenon take place, and then proper measures shall be taken accordingly.
- 6 After welding, cool the joint down in the air for not less than 40 minutes. During cooling process the Electrofusion belt holder shall not be taken away and the joint shall not be subject to any external action. After cooling process is finished, disconnect the welding control box and move the specialty machine away.

Hand or reciprocating saw may be used to cut the pipe off at site. The exposed steel shall be sealed off with handheld extruder or EVA welding lance after pipe cutting.

PS4.2.10 Launch and reception pits

The required launch and receipt pits for pipe cracking shall be excavated and maintained to minimum dimensions. Said excavations shall be adequately barricaded, shored, braced and dewatered, as required, in accordance with the applicable portions of these specifications, including:

- a) Excavation adjacent to the road pavement shall be performed in a manner to adequately support these facilities.
- b) Pipe entry and receiving areas to provide a gradual entry of the pipe without stress to the pipe or joints and to allow free movement into the hole at an acceptable depth.
- c) Where possible, with regard to size and structural integrity, associated structures are to be utilised for pits for pipe cracking equipment. Alternatively, pits are to be located where possible at property connections OR branch connections OR identified localised repairs positions.
- d) Where approved by the Employer's Agent, channelling and walls of existing associated structures may be altered by the Contractor to insert and receive pipes during operations. Where a continuous length of pipe is to be towed in, such as pipe lengths welded together or a coiled pipe, the launch pit shall be of a size to permit insertion of the continuous pipe length without bending to a smaller radius of curvature than permissible by the manufacturer.
- e) Where a continuous pipe length is to be used, the top of the pipe length to be inserted shall be protected from damage at the entry. The Employer's Agent shall approve the method of protection.
- f) Pits shall be reinstated and cleared of all plant, material and debris prior to moving to other sites.

PS4.2.11 No surface disturbance

Pipes installed by means of bursting or pipe cracking shall be in a manner that does not cause upheaval, settlement, cracking, movement or distortion of surface features.

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Contractor to maintain close observation to detect any settlement or displacement of surface and/or adjacent facilities: In the event of settlement or displacement the Contractor is to notify the Employer's Agent immediately, whilst maintaining safe conditions and prevent any further damage from occurring.

PS4.2.12 Damage to services or structures

The Contractor shall satisfy the Employer's Agent that pipe cracking operations shall not have a detrimental effect on adjacent services or structures.

Where the Employer's Agent determines that services adjacent to the existing pipe shall be damaged by pipe cracking, such services shall be exposed and protected.

Services or structures identified by the Employer's Agent, as being damaged by pipe cracking operations shall be repaired at the Contractor's expense.

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**PS4.2.13 Encountering of water during operations**

The Contractor is to provide and maintain a water removal system that has sufficient capacity to remove all encountered water, during operation, in particular during pipe cracking. Such system(s) shall ensure that soil particle removal is kept at a minimum.

PS4.2.14 Post inspection of pipe cracking technology implemented and associated works

The Contractor shall inspect the pipes installed by pipe cracking methods within 7 days after fully completing works, including new installations, and property and lateral connections. Any and all damages to the Works, irrespective of the cause, where such survey is executed outside the aforementioned time span shall be repaired at the expense of the Contractor.

The survey shall capture the full extent of the rehabilitative Works, ensuring that:

- a) the full length of new installation works is captured;
- b) a measurement of the installed pipe circumference is taken every 10m and at intermittent locations where the installed pipe is deformed;
- c) all localized repair sites are captured;
- d) all associated structure connections are captured;
- e) all launch and receipt pit sites are captured; and
- f) any and all defective work is captured, i.e. pipe deformations, pipe tears, non-connected property and branch connections.

PS4.2.15 Testing of pipe cracking method implemented and associated works

The Contractor shall be required to test the replacement pipe at various staged tests:

- a) First test: a tensile strength test shall be performed on minimum 10% of all site performed joints, where the pipe shall be exposed to pulling and shearing forces during installation. Similarly a compression resistant test shall be performed on minimum 1 or 10% (whichever is greater) of all site performed joints, where the pipe shall be exposed to pushing and shearing forces during installation.
- b) Second test: a pressure test, shall be performed before the pipe is tied in. The purpose of this test shall be to check the integrity of joints that have been made, and to verify that the replacement pipe has not been damaged during installation.

Additional acceptance testing following the applicable test procedures shall be performed by the Contractor, if required.

Any detects or poor workmanship shall be corrected at the Contractor's expense.

PS4.2.16 Acceptance of pipe cracking method implemented and associated works

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The Employer or Employer's Agent or their duly authorized representatives shall only accept pipe cracking technology implemented and associated works if the complete installed pipe length section has been pressure tested.

Additionally, all test results as required for the applicable technology application shall be submitted to, and approved by, the Employer's Agent prior to the acceptance of the works.

PS4.2.17 Site restoration

Following all Works completion, the Contractor shall disassemble all equipment and restore the site to original condition. Any noticeable surface defects, due to the executed Works, shall be repaired by the Contractor.

All excavations shall be backfilled and compacted to minimum density of 95% MOD ASSHTO, unless otherwise instructed by the Employer's Agent.

PS4.2.27.2 Water Chambers step irons

Manhole step irons shall conform to the applicable standard SANS requirements, but shall be:

- a) spaced at 300mm centres;
- b) distanced not exceed 600mm between the top of casting and the first step; and
- c) plastic or similar approved.

PS4.2.28 Chamber bedding

- a) Precast chamber: Precast chambers bases shall be bedded on granular material or acceptable undisturbed foundation material.
- b) Cast-in-place chambers: Concrete bases shall be poured on granular material or acceptable undisturbed foundation material.

PS4.2.29 Watertight testing

Water chambers shall be watertight structures, including any repair or rehabilitation portions. On completion of all chamber repairs and/or rehabilitations and proper elapsed curing time for the waterproofing materials, the manholes shall be visually inspected. The inspection shall be performed at the discretion of the Employer's Agent or his duly authorised representative during the warranty period following a rainfall sufficient to increase the flow in super-imposed stormwater drainage and raise the ground water table above the problem areas. All leakage problems determined by this inspection shall be corrected by the Contractor within an agreed upon time, to the satisfaction of the Employer's Agent or his duly authorised representative, at no additional cost.

PS4.2.29.3 Testing

All sampling and testing of material in accordance with manufacturers specifications.

PS4.2.29.4 Jointing of pipes and fittings

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Jointing of the replacement pipe, existing and new fittings shall be:

- a) in accordance with manufacturer's recommendations to provide a leak proof joint;
- b) sufficiently strong to undergo the loading of the installation process; and
- c) subject to acceptance by the Employer's Agent prior to insertion.

PS4.2.29.5 Property or branch connection excavation

- a) Property or branch connections shall be exposed and disconnected from the existing pipe prior to commencement of bursting. Property or branch connections to be redirected to temporary water line.
- b) All excavations for property or branch reconnections shall be the minimum necessary to execute the operations. Care shall be taken to prevent material entering the live existing system when performing the disconnection and/or connection.

PS4.2.29.6 Reconnection of property and branch connections

Property connections shall not be out of service for more than 8 hours, unless otherwise agreed in writing with the property owner or occupier. If this is not possible, temporary connections are to be made at convenient locations as approved by the Employer's Agent.

All connections shall be by means of approved fittings, in accordance with the manufacturer's instructions, for:

- a) PVC pipes and fittings, using either, solvent-cement joints, push-on joints, threaded joints, clamps or flanged joints.
- b) HDPE pipe and fittings, using fusion jointing techniques, clamps or flange joints (either installing flange ended fittings, HDPE flange adapters and mechanical couplings)

All polyethylene electro-fusion fittings shall be made in accordance with an appropriate and approved specification. If applicable, the grade of polyethylene of the fitting shall be the same as the replacement pipe

NOTA BENE: The replacement pipe shall be left for the manufacturer's recommended time, but normally not less than 4 hours, prior to service reconnections. This period shall allow for pipe shrinkage due to cooling and pipe relaxation due to the tensile stresses induced in the pipe during installation.

PS4.2.29.8 Annular gap sealing for burst pipes

All annular gaps between the replacement pipe and the bore or existing pipe, in excess of 10mm, shall be grouted. This compound shall be as approved by the Employer's Agent, but not have such rapid setting characteristics.

PS4.2.30 Localized pipe replacement or repair

PS4.2.30.1 Coupling clay and PVC or PE pipes

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The Contractor shall ensure couplings between clay and PVC or PE pipes are durable and watertight SABS approved. All metal components of couplings shall be denso (or similar approved) wrapped to prevent corrosion.

PS4.2.31 Concrete, formwork and reinforcement

NOTA BENE: All in situ concrete work (mass and reinforced) shall comply with SANS 1200G ("8.Measurement and Payment" is not applicable) supplemented by the clauses in this section. Where:

- SANS 1200G and the clauses in this section are in conflict, the clauses in this section shall take precedence.
- the term "plain concrete" appears in SANS 1200G it shall be read as "mass concrete".

PS4.2.31.1 Cement

Cement shall be Portland cement (or similar approved) complying with the requirements of SANS 50197-1/EN 197-1 or SANS 5831.

Samples of cement from any one, or from every consignment, may be required by the Employer's Agent or his duly authorized representative for test purposes. Cement in any consignment from which a sample may have been taken for testing shall not be used until it has been approved. Allowance shall be made for possible delay in that tests may take 10 days to carry out.

Bags of cement shall be stacked in a waterproof, solidly constructed shed with a central door and a floor rendered damp-proof with a tarpaulin. The bags of cement shall be closely stacked (but not against walls) in order to reduce air circulation in such a manner that the cement is used in the order in which it was received, i.e. first in first out.

Unless otherwise specified in the these documents the use of ordinary Portland cement blended with ground granulated blast furnace slag complying with SANS 1491, or ordinary Portland Cement blended with Pulverised Fly Ash complying with SANS 50197-1/EN 197-1 will be allowed in certain instances as an alternative, after acceptance of tender offer, but only with the approval of and at the sole discretion of Employer's Agent. If not so specified in the documents the Contractor must demonstrate a saving in favour of the Employer together with this alternative.

PS4.2.31.2 Sand (Fine aggregate)

The fine aggregate shall comply with the requirements of SANS 1083. Other aggregates may be approved if they have a satisfactory history and/or test results.

No aggregate may be used until it has been approved. Samples having a mass of 25kg (16,5l) of the aggregate proposed to be used may be required by the Employer's Agent or his duly authorized representative for test purposes. Samples having a mass of 25kg shall be forwarded every 3 months during concreting work and also if the source of supply is changed. Allowance must be made for possible delay in that the tests may take 14 days to carry out.

PS4.2.31.3 Stone (Coarse aggregate)

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- a) The coarse aggregate shall comply with the requirements of SANS 1083. No aggregate may be used until it has been approved. Samples having a mass of 25kg (16,5l) of the aggregate it is proposed to use may be required by the Employer's Agent or his duly authorized representative for test purposes. Samples shall be forwarded every 3 months during concreting work and also if the source of supply is changed. Allowance must be made for possible delay in that the tests may take 14 days to carry out.

NOTA BENE: Certain fine grained sand and stone originating from the Beaufort Series and Karoo Systems which are known by reputation, local experience or tests, to exhibit excessive shrinkage when used in concrete, may be deemed unacceptable by the Employer's Agent or his duly authorized representative.

- b) A certificate of proof is required from the Contractor that the aggregates are not alkali-reactive. The cost of testing and certification are to be borne by the Contractor.

PS4.2.31.4 Concrete

Concrete shall be of the classes given in the following table. The proportions of the ingredients and the nominal size of the coarse aggregate for each class shall be as laid down therein:

Class	Cement	Aggregate			Strength (MPa)
	Part	Fine	Coarse	Size	
		Part	Part		
A	1	4	8	50	10
B	1	3	6	38	15
C	1	3	6	19	15
D	1	2	4	38	25
E	1	2	4	19	25
F	1	1 1/2	3	19	30
G	1	1	2	19	40

The strength given in the above table shall be the minimum required at 28 days. Unless otherwise specified Class B concrete shall be used for mass concrete and Class E concrete for reinforced concrete.

Maximum concrete slumps acceptable for different types of construction concrete are as follows:

- a) Vibrated reinforced concrete = 50mm
b) Un-vibrated reinforced concrete = 75mm
c) Mass concrete = 75mm

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When so required by the Employer's Agent or his duly authorized representative, and whilst concreting is in progress, the consistency of the mixture shall be ascertained by means of the slump test as later described herein.

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PS4.2.31.5 Volume batching

The coarse and fine aggregate shall be measured by volume and, unless otherwise directed, cement shall be measured by mass: the volume of a 50 kg bag of cement shall be taken as 33l. Suitable measuring boxes for the coarse and fine aggregates shall be provided to the approval of the Employer's Agent or his duly authorized representative.

The proportions given above are approximate only, and should the Employer's Agent or his duly authorized representative consider that the voids in the coarse aggregate require more or less matrix than is formed by the proportions specified, he may vary the quantities of coarse and fine aggregates to obtain the required density and workability of the concrete, provided that the proportion of cement to the total volume of the aggregate shall not be less than that specified.

When the sand is not completely dry, allowance must be made for bulking due to the moisture content. The amount of bulking shall be determined by the Contractor in the presence of the Employer's Agent or his duly authorized representative.

The amount of water shall never exceed 34l to every bag of cement used, including the water contained in the sand.

Effective screens shall be provided to protect the mixing of concrete during windy weather.

PS4.2.31.6 Weigh batching

The proportioning of the coarse and fine aggregates by mass shall be permitted, providing the method used is approved by the Employer's Agent or his duly authorized representative.

- a) All requests received by the Employer's Agent or his duly authorized representative to make use of weigh batching shall be submitted to the Employer's Agent for approval.
- b) If the weigh batching process is preferred to volume batching, the proposed mix proportions are to be equivalent to the relevant volumetric mixes as documented previously herein and be based on a minimum cement content.
- c) The following procedures must be complied with:
 - i) The Contractor must timeously obtain written approval for the use of weigh batching and submit all information as set out below, with his application.
 - ii) The mix transformation from volume to weigh batching shall be carried out at an approved laboratory.
 - iii) Weigh batching equipment must be calibrated and a certificate of accuracy must be submitted before such equipment may be used. On contracts of long duration and/or requiring large quantities of concrete, new calibration certificates may be required every four months.
 - iv) The cement to aggregate ratio by volume for the following mixes will apply:

• Class C (15 MPa)	- c/a	=	1:9
• Class E (25 MPa)	- c/a	=	1:6
• Class F (30 MPa)	- c/a	=	1:4.5
• Class G (40 MPa)	- c/a	=	1:3

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v) The following cement/water ratios by mass must also be complied with:

- Class C (15 MPa) - c/w = 1.30 to 1.35
- Class E (25 MPa) - c/w = 1.65 to 1.80
- Class F (30 MPa) - c/w = 1.90 to 2.05
- Class G (40 MPa) - c/w = 2.30 to 2.50

PS4.2.31.7 Ready mixed concrete

Any application to use ready mixed concrete shall be submitted by the Contractor at an early stage for approval by the Employer's Agent. Only suppliers on the Employer's approved list will be considered.

New applications must be submitted to the Employer, well in advance.

PS4.2.31.8 Strength concrete

The Contractor shall be responsible for the design of strength concrete and for the measurement of the constituent materials to produce concrete that complies with the specified requirements.

a) Trial mixes

The Contractor shall ensure that samples of the constituent materials of the concrete, together with evidence that they comply with the provisions, are supplied for approval in good time and provide the Employer's Agent or his duly authorized representative with:

- i) a statement from an approved independent laboratory of the results of tests; or
- ii) an authoritative and acceptable report, or record of the previous use of and experience with, the material concerned.

The cement, types of aggregate and their origins shall not be changed throughout the duration of the Contract without giving prior notification to the Employer's Agent who shall verify that the above requirements are complied with and that the important qualities of the concrete shall not be impaired.

b) Consistency

Unless otherwise indicated by the general workability of the concrete, method of transportation, conditions of placement or otherwise specified by the Employer's Agent, the suggested slump values, for different mixes of concrete shall be as specified in this document.

c) Workability

Ensure that the concrete is of such workability that it can be readily compacted into the corners of the formwork and around reinforcement without segregation of the materials and without excessive "bleeding" of free water at the surface.

PS4.2.31.9 Expansion alkali-aggregate reaction

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The use of some local aggregates may lead to an expansive alkali-aggregate reaction if the concrete in the structure will be exposed to continual dampness, or will be subject to alternate wetting and drying.

Alkali reactive aggregates, i.e. certain granites, quartzites and Malmesbury hornfels (shale), shall not be used in conjunction with high alkali cement for concrete in any part of the works. Where a high alkali cement shall be one in which the equivalent alkali content exceeds 0,60% by mass of the cement.

If the Contractor chooses to use one of the aggregates stated above in lieu of stone as described in this document he shall:

- a) ensure that no high alkali cement is delivered to the site. Any such high alkali cement shall be rejected and the cost of its removal and replacement with cement having an acceptable alkali content shall be borne by him.
- b) provide certificates stating the alkali content of each delivery of cement to the site, based on tests carried out at a laboratory approved by the Employer's Agent. The cost of testing, including sampling, transporting of samples and issuing of certificates, shall be borne by him.
- c) be entitled to use an approved brand of cement as a means of ensuring that the permissible alkali content is not exceeded. Where he shall make allowance for the higher price of such approved brand, if he chooses to use this method.

PS4.2.31.10 Pumping of concrete

The placing of concrete by pumping in any section of the works shall be subject to the written approval of the Employer's Agent or his duly authorized representative. The Contractor shall furnish full details regarding the mix proportions of the concrete that he intends to place by pumping.

PS4.2.31.11 Admixtures to concrete

The use of admixtures in concrete shall only be considered should special circumstances warrant this and only with the prior written approval of the Employer's Agent. The Contractor shall provide the following information:

- a) the trade name of the mixture, its source and the manufacturer's recommended method of use;
- b) typical dosage rates and possible detrimental effects of both under and over dosage; and
- c) the expected average air content of freshly mixed concrete containing an admixture which causes air to be entrained when used at the manufacturer's recommended rate of dosage.

PS4.2.31.12 Slump test

The apparatus and the method of determination of the slump of freshly mixed concrete shall comply with SANS 5862-1.

- a) Apparatus
 - f) A mould in the form of a frustum of a cone and having the following nominal internal dimensions:
 - Bottom diameter : 200mm

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- Top diameter : 100mm
- Height : 300mm

The mould shall:

- be of a metal (other than brass or aluminium) of side thickness at least 1.6 mm and shall have a smooth internal surface.
 - have suitable base plate and handles to facilitate lifting it from the test specimen in a vertical direction.
- ii) The tamping bar shall have a nominal diameter of 16mm, a length of 600mm and with sharp corner rounded off at one end.

b) Procedure:

The test shall be carried out in an area that is free from vibration and shocks. Ensure that the internal surfaces of the mould are free from set concrete and are clean and dry.

Place the mould with the bottom on a smooth, horizontal, rigid, non-absorbent surface and hold the mould firmly in place while it is being filled as follows:

- i) in four layers, each thickness approximately one-quarter of the height of the mould. Tamp each layer with 25 strokes uniformly spaced over the cross-section of the mould. Tamp the bottom layer throughout its depth and ensure that when tamping the second and subsequent layers the strokes penetrate into the underlying layer.
- ii) after the top layer has been tamped, strike off the concrete level so that the mould is exactly filled. Clean off any concrete that may have leaked out between the mould and the supporting base-plate surface. Remove the mould from the concrete immediately by slowly and carefully raising it in a vertical direction. This will allow the concrete to subside.

Immediately measure the slump, to the nearest 5mm, by determining the difference between the height of the mould and the height of the specimen.

Regard the test as invalid, if a slump specimen collapses or shears off laterally, discard the result and repeat the test.

PS4.2.31.13 Concrete cubes

The apparatus for making and testing of concrete cubes shall comply with SANS 5863.

a) Apparatus

Cubic metal moulds shall:

- be steel;
- be machined and adequately strengthened to resist distortion;
- have an internal distance between faces of 150mm;
- be constructed so as to facilitate the easy removal without damage of the moulded specimen; and
- have a metal base plate which shall be attached to the mould by springs or screws.

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When assembling the mould for use, the joints between the sections of the mould, the contact surfaces between the bottom of the mould and the base plate, and the internal faces of the assembled mould shall be thinly coated with a grease or oil that will prevent leakage of water through the joints and adhesion of the concrete to the mould.

The tamper must be a steel bar of length 400mm and mass 1.8kg, and having a 25mm square ramming face.

- b) Sampling and making cubes
Sampling shall comply with SANS 5861-2.

One set of 3 cubes shall be required for every 40m³, or part thereof, of concrete cast. The sample taken from a batch of concrete and sufficient to make 3 cubes shall be placed in a tray or on a platform and mixed thoroughly.

The moulds shall each be filled in 3 layers of approximately 50mm thick concrete. Each layer shall be compacted with the tamping rod, with at least 35 blows to give full compaction of the concrete.

After the top layer has been compacted, strike off the surface of the concrete with a trowel, level with the top of the mould.

Any small hollows shall be filled in with additional concrete. Cement/sand slurry shall not be worked into the surface.

At this stage, the identity of each sample shall be placed on the moulded cube, by means of a label of absorbent material and not by scouring of the surface of the concrete.

- c) Curing cubes on site
Cover the test cubes in their moulds with an impervious sheet or wet sacking and store indoors in a place that is free from vibration, excessive draughts, cold and direct sunlight.

After 24 hours the cubes shall be demoulded, remarked with a waterproof crayon or marker and placed in a curing tank for 7 days before being transported to the laboratory.

The Contractor shall supply the curing tank which shall incorporate a thermostat to control the water temperature at 22 to 25°C and shall be kept within a building.

- d) Testing of cubes
The testing of all concrete cubes shall be done in accordance with SANS 5863 by a laboratory approved by the Employer's Agent.

A suitable testing machine of sufficient capacity having an accuracy and repeatability that comply with the requirements for Grade A machines of BS 1610 "Method for the load verification of testing machines" shall be used to test the compressive strength of each cube.

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The Contractor is responsible for the provision of the cube moulds and for timeous delivery of the cubes to the laboratory.

PS4.2.31.14 Concrete quality

Should the Contractor dispute any results obtained from concrete test cubes, the concrete represented by the cubes shall be considered acceptable if the Contractor, at his own cost, proves to the satisfaction of the Employer's Agent that the estimated actual strength of cores taken from the structure (by an approved independent testing laboratory and determined in accordance with SANS 5865 is not less than the specified strength. If the concrete fails to meet the strength criteria stipulated, the Employer's Agent may at his sole discretion and in addition to the options listed in SANS 1200G:

- a) accept the concrete subject to approved remedial measures being undertaken by the Contractor at his own cost; or
- b) permit the concrete to remain, subject to reduced payment for lower strength concrete.

PS4.2.31.15 Concreting

It is essential that the Contractor representative who has charge of the construction of all concrete work, whether reinforced or not, shall be skilled in this class of work, and shall personally supervise the whole construction, paying special regard to:

- a) the quality, testing and mixing of the materials;
- b) the laying of the material in place and the thorough compaction of the concrete to ensure solidity and freedom from voids;
- c) the construction and removal of formwork; and
- d) the sizes and positions of the reinforcement.

Particular care shall be taken to work concrete against formwork and around reinforcement. Internal vibrators may be used with the approval of the Employer's Agent or his duly authorized representative but external vibrators which act only on the formwork WILL NOT be permitted.

Concrete to be reinforced shall be deposited in such quantities as will permit of it being properly compacted around the reinforcement.

The placing of concrete shall be completed within ½ hour after mixing or within ½ hour after agitating and within 2,5 hours after mixing in the case of ready mixed concrete. Under no circumstances shall concrete be incorporated into the work after it has attained its initial set.

Care shall be taken to prevent, as far as possible, the formation of laitance or scum. Laitance is to be understood to mean the scum of strengthless and inert material which forms on the surface of concrete.

Concrete shall not be dropped into position from a height greater than 2.5m unless prior approval is obtained from the Employer's Agent.

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If an inclined chute is used for transporting concrete, it shall be of such slope as will ensure a continuous flow of concrete without the use of an excessive quantity of water and without segregation of the aggregates. The chute must be flushed out and properly cleaned before and after each working period. All waste from flushing shall be discharged outside the formwork.

In beams, each portion of a successive layer shall be placed as soon as the concrete below has been properly worked around reinforcement and against formwork. Concreting shall be carried forward in irregular steps, that is to say, one layer shall not be completed over the whole section before the succeeding layer is commenced. Concreting of slabs and beams shall, as far as possible, be carried forward in one operation. When concreting has to be interrupted the concrete shall be left with a level, rough top surface with ends vertical. The concrete shall not be merely sloped down.

On resuming concreting, the old surface shall be roughened and all laitance thoroughly and carefully removed before any new concrete is deposited. This must be carried out by brushing the surface of the concrete while it is still green. Great care must be taken to avoid any weakness at the junction of old and new concrete and the old surface shall be coated with a thin layer of cement and sand mortar, in the same proportions as that of the adjoining concrete.

While the concrete is setting it shall not be disturbed or shaken by traffic, either on the concrete itself or upon adjoining formwork.

No holes in concrete elements shall be patched or filled in without inspection, instruction and approval of the Employer's Agent or his duly authorized representative.

No concreting shall be carried out when the air temperature is below 4°C when it is rising and 8°C when it is falling.

Before concreting is commenced the Contractor shall give the Employer's Agent or his duly authorized representative 24 hours' notice of his intention to do so. On sites further than 200km from the Employer's Agent or his duly authorized representative, 48 hours' notice must be given.

Concrete surface beds, excluding heavy industrial floors etc. shall be Class C concrete and shall be laid in suitable size panels not exceeding 20m² in area and with the length of any panel not exceeding 4.5m.

Where concrete beams are supported on concrete columns, the columns are to be concreted up to the underside of such concrete beams and then concreted up to the top of the beams, integral with the beams.

NOTA BENE: Any finish applied to the surface of concrete floors, is to be understood as being additional to the thickness of the concrete described or shown on the drawings.

PS4.2.31.16 Curing of concrete

After the concrete has been placed, all exposed surfaces shall be kept continuously damp for at least 10 days by methods as may be approved by the Employer's Agent or his duly authorized representative, such as covering with approved building paper, or by means of wet canvas, wet sacks, wet sand, by continuous hosing or ponding with water.

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PS4.2.31.17 Concrete lintels (cast in-situ)

Concrete lintels cast in-situ shall be of Class E concrete, reinforced with steel reinforcement as well as of depths specified in the table hereunder. Each lintel shall be the full thickness of walls into which they are cast and 450mm longer than width of openings.

Clear or daylight span	Depth in brick courses	Reinforcement
< 1m	3	Nil
$\geq 1\text{m} \leq 1.5\text{m}$	3	One 12mm diameter mild steel rod, 40mm up from bottom, for each half brick width of soffit.
$> 1.5\text{m} \leq 2\text{m}$	4	One 16mm diameter mild steel rod, 40mm up from bottom, for each half brick width of soffit.
> 2m	To detail	To detail.

PS4.2.31.18 Building on concrete footings and beams

No brickwork, stone walling or other structure shall be built on concrete footings until at least 3 days after placement of the concrete in the case of mass concrete footings and after 7 days in the case of reinforced concrete footings or as may otherwise be directed by the Employer's Agent or his duly authorized representative.

No brickwork, stone walling or other structure shall be built on reinforced concrete beams or similar members until the formwork and all propping or supports have been removed.

PS4.2.31.19 Slip joints between concrete and brickwork

Slip joints shall be provided between brickwork and concrete slabs and beams by levelling up and trowelling smooth the bearing surfaces of brickwork with 3:1 cement mortar and covering the bearings before the concrete is cast, with two layers of one side smooth tempered hardboard, with the smooth sides in contact.

The ends and sides of beams and edges of concrete slabs shall be separated from the brickwork with 13 mm thick bitumen impregnated softboard or expanded polyethylene strips placed vertically against the brickwork before the concrete is cast.

Similar slip joints shall be provided between brickwork and concrete lintels cast in situ, but without softboard or expanded polyethylene strips at ends.

PS4.2.31.20 Movement joints

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All movement joints are to be filled in with approved bitumen impregnated softboard or expanded polyethylene strip unless otherwise specified or detailed on drawings. Form similar movement joints where pathways adjoin structures externally.

PS4.2.31.21 Cutting, punching or hacking concrete

No reinforced concrete shall be cut or hacked without the approval of the Employer's Agent or his duly authorized representative.

PS4.2.31.22 Forming key to concrete for plaster and other finishes

Where rough formwork has been used, surfaces of concrete to receive plaster and other finishes, shall, immediately after the formwork has been removed, be well wetted and wire brushed whilst the concrete is still green and then slushed over with 2:1 cement grout to form a key for the finish, all to the approval of the Employer's Agent or his duly authorized representative. The slushing is to be allowed to set hard before the finish is applied.

Where smooth formwork is used, surfaces of the concrete to receive plaster and other finishes shall be hacked, on the distinct understanding that hacking of concrete shall be at no extra cost.

Surfaces of concrete receiving plaster or other finishes shall not be plastered or finished until the Employer's Agent or his duly authorized representative has signified his opinion that the surfaces are suitable to receive plaster or other finishes.

PS4.2.31.23 Sleeves pieces

Where it is necessary to leave plugs or holes in beams, slabs or any other reinforced concrete, all such plugs or holes must be situated in positions approved by the Employer's Agent or his duly authorized representative before concreting. Where it is necessary to carry pipes, bolts, wires or any other fittings through reinforced concrete members, approved pipe sleeves must be provided and placed in position before concreting.

All necessary bolts, plugs, brackets, cramps, etc. shall be cast into the concrete as the work proceeds.

PS4.2.31.24 Ties

Where brickwork abuts against concrete, the brickwork is to be tied to the concrete with galvanized hoop-iron ties 1.6mm thick by 3mm wide and approximately 600mm long to every third course of brickwork with one end of each tie cast approximately 150mm deep into the concrete. Where such fixing is impossible, i.e. where steel formwork is used, the ties are to be gun-nailed against concrete with steel nails not less than 38mm long.

PS4.2.31.25 Bagged finish to concrete

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Concrete surfaces to receive bagged finish shall be prepared by removing sharp projections and making good defects with 3:1 cement mortar. Finish by rubbing over the whole area with wet rough sacking and cement grout to obtain an even surface.

PS4.2.31.26 Power floated finish

Power floated finish to floors or slabs means that surfaces shall be floated mechanically to a smooth and even finish before the concrete has set. Small areas inaccessible to the machine are to be floated by hand. Under no circumstances is cement mortar to be added while floating the concrete.

PS4.2.31.27 "No-fines" concrete

"No-fines" concrete, for grading flat concrete roofs and the like to falls, shall be in the proportion of 12 parts 19 iron cubical stone to 1 part cement mixed with 20l water per bag of cement and be laid to falls of not less than 15mm per linear metre for mastic asphalt and not less than 20 mm per linear metre for sheet roof covering. For heavy load applications special mix designs may be required.

- a) Fillets against upstands
 - Form triangular fillets, size 75 x 75mm, in corners with walls, kerbs, etc. neatly mitred at angles, stopped where necessary and finished smooth ready to receive waterproofing.
- b) To raised floors, bases and other

"No-fines" concrete for raised floors, bases, etc. shall be in the proportions specified. Finish smooth with 3:1 sand/cement screed to receive waterproofing.

PS4.2.31.28 Cellular concrete

Cellular concrete, for grading flat concrete roofs and the like to falls, shall be laid in situ in required layers; the bottom layer having a density of 400kg/m³, dressed to falls by varying the thickness, and a 20mm thick top layer having a density of 960kg/m³.

PS4.2.31.29 Formwork

Formwork shall include all shuttering, casing and centering of material required for the laying and forming of concrete floors, slabs, beams, lintels, walls, steps, columns, piers, pilasters and any other concrete work requiring moulds or forms and shall embrace all cleats, battens, fillets, wedges, struts, trestles, braces, props, shores and other requirements of material for keeping all in correct position. All materials used for formwork must be suitable and substantial and all joints must be tight enough to prevent leakage of liquid matrix.

All formwork must be designed by the Contractor and if requested to do so, he must submit fully detailed and dimensioned working drawings to the Employer's Agent or his duly authorized representative for checking purposes. Acceptance of the proposals shall not relieve the Contractor of his responsibility for the safety and stability thereof nor for any loss or damage arising out of defective design, materials and/or workmanship.

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The formwork must be so constructed that its partial removal can be carried out to the satisfaction of the Employer's Agent or his duly authorized representative and in such stages as are required by the working conditions. As far as possible, wedges and clamps must be used in preference to nails. All formwork in its various sections for floors, beams, etc. must be so arranged that the whole may be raised or lowered either independently or together with other sections by means of wedges or other approved methods.

Immediately before concreting is begun, the formwork in contact with the concrete must be thoroughly cleaned, wetted and kept damp whilst the concrete is being placed.

Great care must be taken to keep the formwork wedged up to its correct height and this must be checked by taking levels immediately before concreting is commenced and immediately after it has been completed.

All beams shall have a camber of 6mm to every 3m of length.

The minimum periods that the formwork to the various parts of the structure is to remain in position after concreting shall be as stated in the following table:

Description	Normal cement		Rapid hardening cement	
	Weather		Weather	
	Normal	Cold	Normal	Cold
Beam sides, walls, unloaded columns	2 days	4 days	1 days	2 days
Slabs with props left under	4 days	7 days	2 days	4 days
Beam soffits with props left under including ribbed slabs	7 days	12 days	3 days	5 days
Removal of slab props	10 days	17 days	5 days	9 days
Removal of beam props	14 days	28 days	7 days	12 days

When determining the stripping time for formwork the weather shall be considered to be "normal" when the temperature is above 18°C and "cold" when the temperature is between 5°C and 10 °C, these being the average daily temperatures of the atmosphere adjacent to the concrete. When the average daily temperature lies between the above values for "normal" and "cold" weather the minimum period for stripping of formwork shall be determined by the Employer's Agent or his duly authorized representative.

Notwithstanding the above minimum periods, formwork may be struck immediately, once the concrete in the various parts of the concrete work has attained the crushing strengths required by

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the Employer's Agent or his duly authorized representative. The crushing strengths must be determined by proper tests, which shall be carried out by the Contractor.

No formwork of any nature shall be struck, either after the elapse of the minimum periods stated in the above table or on the attainment of the required crushing strengths of the concrete, without the prior consent of the Employer's Agent or his duly authorized representative. Such consent shall not absolve the Contractor of his responsibility for the safety of the works.

In structures having either in whole or in part, two or more reinforced concrete floors, props shall be provided under the soffits of any beam or slab of any floor which is being used to support the formwork and wet concrete of the floor above, all to the approval of the Employer's Agent or his duly authorized representative. The props shall not be removed until the formwork supporting the concrete of the floor above has been struck.

Under no circumstances shall steel formwork be oiled where concrete is to receive plaster.

PS4.2.31.30 Smooth formwork

Smooth formwork shall be any material approved by the Employer's Agent or his duly authorized representative which is to be used to leave concrete surfaces smooth when removed and where no other finish is to be applied.

PS4.2.31.31 Reinforcement rods

a) Mild steel

Mild steel shall comply with the requirements of SANS 920, Type A or B.

b) High tensile steel

High tensile steel shall comply with the requirements of SANS 920, Type C or D.

PS4.2.31.32 Concrete reinforcement

a) Rod reinforcement

Bending and hooking of rods shall be done in accordance with SANS 282. Rods shall be bent cold in an effective bending machine, or properly designed rod-bender using a steady pressure and not by hammering.

Diameters, lengths and positions of rods as shown on the drawings must be strictly adhered to. Joints in rods in beams, stairs, etc. will be permitted only where shown on drawings.

Before being placed in position, the rods shall be thoroughly cleaned of all grease, dirt, bituminous material, scale and loose rust.

All distribution rods shall be straight and shall extend at least 150mm into beams or other support. Unless otherwise shown on the drawings, all joints in reinforcing rods shall be lapped 40 times the

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diameter of the rod. The laps shall be securely tied with 1.25mm diameter annealed mild steel binding wire.

Reinforcement for piles, column footings, columns and walls shall be tied at every intersection, or as directed or shown on drawings, with similar binding wire. Reinforcement in beams shall be tied at alternate intersections in a diamond pattern, unless circumstances demand every intersection.

Great care must be taken to retain the reinforcement in its correct position during the entire period of concreting. Blocks of fine concrete, size approximately 40 x 40mm, or plastic spacers, shall be provided on the formwork to soffits of beams to ensure that the rods are retained in position and that the correct concrete covering to the main reinforcing rods is provided. The blocks shall be of thickness required and shall be placed under the main reinforcing rods at approximately 600mm centres. Reinforcement in the top of slabs and the like shall be retained in position by means of cradles (stools), formed of steel reinforcing rod as follows:

- R10 for height range 100-300mm and maximum width of 300mm.
- R12 for height range 310-500mm and maximum width of 45 mm.

Recommended spacing of supports for horizontal bars in slabs:

- not further than 600mm apart (cradles ± 1000 mm c/c in both directions) for bar diameters up to 12mm.
- not further than 1,000mm apart (cradles $\pm 1\ 500$ mm c/c in both directions) for bar diameters of 16mm and over.

Stools are to be placed on the bottom layer of reinforcement, securely retained in position and with correct concrete cover as specified. Cradles are to be securely wired to the slab reinforcement with binding wire. Beam rods in different layers shall be separated by means of steel spacer bars of suitable diameters and lengths.

Double mats in concrete walls shall be kept in their respective positions by means of suitable steel clips.

Recommended spacing of supports for vertical bars in walls:

- 1,000mm centres in both directions for bars up to 12mm diameter; and
- 1,500mm centres in both directions for bars of 16mm diameter and over.

Supports can be spaced more closely by the Employer's Agent, depending upon the circumstances. All stirrups shall be properly fastened to the rods so as to retain their relative positions during the entire period of concreting.

Welding of main rods will not be permitted unless approval has been given by the Employer's Agent or his duly authorized representative. Spot welding in lieu of wiring may be used to secure rods and stirrups in position.

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The concrete covering the main reinforcement, unless otherwise specified, shall not be less than that stated in the following table:

Position	Amount of cover
Soffit of slabs	The diameter of the main rods, but never less than 15mm (mm)
End of beams	40
Soffits of beams	40
Sides of beams	40
Sides of columns	40
Slab underground	40
Concrete walls	25
Walls exposed to ground	40
Ground beams	40
Foundations	75
Water retaining structures and within 1 km from coast	50

In cases not included in the above table the cover shall be not less than 25mm. Depending on the condition of exposure and fire resistance requirements, concrete cover can be varied by the Employer's Agent but in no case shall the concrete cover be less than the diameter of the rod to be covered.

The cover shall be measured from the face of the concrete to the outside of main reinforcement nearest the face of the concrete, and shall exclude plaster and similar finishing materials. Three samples of each diameter of reinforcing rods, each approximately 600mm long, must be taken from each consignment of rods of similar diameter, for testing. If any sample is found unsatisfactory, the whole consignment of rods from which the samples were taken shall be rejected.

Top reinforcement in cantilever slabs to be kept in position with a first row of stools or chairs 300mm from the beam or support, and thereafter at a maximum of 40 bar diameters under each bar.

The cover blocks, spacers, bars and stools or chairs are to be placed and/or wired in position by the steel fixer.

b) Welded steel fabric reinforcement

All welded steel fabric reinforcement shall comply with the requirements of SANS 1024. The preferred dimensions are as follows:

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1	2	3	4	5	6
Fabric Reference number	Nominal pitch of wires	Nominal diameter of wires		Nominal mass*	
	Longitudinal (mm)	Cross (mm)	Longitudinal (mm)	Cross (mm)	kg/m2
617	200	200	10.0	10.0	6.17
500	200	200	9.0	9.0	5.00
395	200	200	8.0	8.0	3.95
311	200	200	7.1	7.1	3.11
245	200	200	6.3	6.3	2.45
193	200	200	5.6	5.6	1.93
100	200	200	4.0	4.0	1.00
772	100	200	10.0	7.1	7.72
655	100	200	9.0	7.1	6.55
517	100	200	8.0	6.3	5.17
433	100	200	7.1	6.3	4.33
341	100	200	6.3	5.6	3.41
289	100	200	5.6	5.6	2.89
278	100	300	6.3	4.0	2.78
226	100	300	5.6	4.0	2.26
133	100	300	4.0	4.0	1.33

*These mass values are based on the wires having mass of 0,00785 kg/mm² per metre of length.

The actual mass of the fabric should not differ from the nominal value by more than 6%.

PS4.2.32 Precast concrete

PS4.2.32.1 Materials

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Cement, water, aggregates and reinforcement shall be as described under the concrete section.

PS4.2.32.2 Concrete, formwork and reinforcement

PS4.2.32.3 Concrete

Concrete shall be as described under the applicable concrete section(s). Unless otherwise specified a Class E concrete shall be used but with coarse aggregate of an appropriate size.

PS4.2.32.4 Mould units

The whole of this work is to be carried out by a specialist, who has appropriately skilled workers in this class of work.

All materials and finishes are to be to the approval of the Employer's Agent or his duly authorized representative.

The moulds are to be properly constructed in the best and most up to date practice, made up in suitable sections with all necessary reinforcement, cramps, bands, bolts, etc. for fastening together and are to be constructed so that castings can be easily removed and the moulds re-used without distorting.

Those sections of the moulds which will produce the finished faces of the units are to be specially prepared, perfectly smooth, except where the finish is of exposed aggregate, true to shape and coated with a suitable solution which will prevent units adhering to the moulds, while not in any way discolouring the finished surfaces.

All cast units are to be properly cured and no units are to be fixed or built in until 28 days after casting.

Units are to be properly protected from the elements while curing and are to be kept wet for at least 10 days after casting by frequent spraying with clean water.

Form all necessary checkings, mortices, lugs, etc. for cramps and dowels when casting.

PS4.2.32.5 Terrazzo blocks

Precast terrazzo work shall be generally as prescribed for precast concrete above. The coarse aggregate of the mix of which blocks are to be formed shall be of 10mm stone. The finish to exposed faces shall be 10mm thick.

PS4.2.32.6 Smooth finish

Where described as "finished smooth from the mould" such surfaces shall have a layer composed of 1 part (volume) cement and 4 parts (volume) clean fine sand, packed against the faces of the

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mould before placing the concrete backing. The concrete backing shall be deposited into the moulds in a wet state (not dry pressed) whilst the facing is still wet.

Projections shall be rubbed off and faces shall be of even colour and free from blemishes, cracks and other imperfections. Salient angles shall be arris rounded.

PS4.2.32.7 Sizes

Sizes given are approximate; the Contractor shall be responsible for ascertaining the exact sizes based on actual measurements.

PS4.2.32.8 Reinforcement

Unspecified reinforcement required for manufacturing, handling and erection purposes and for reinforcing projecting and other unwieldy portions of blocks shall be provided by the Contractor at his discretion, but such action shall be highlighted to the Employer's Agent.

PS4.2.32.9 Bedding, joint and pointing

Blocks shall be bedded and jointed solidly in cement mortar composed of 3 parts (volume) of sand and 1 part (volume) of cement and shall be pointed with slightly keyed joints.

PS4.2.33 Masonry

(Including brickwork and stone masonry)

NOTA BENE: Where sizes in descriptions are given in brick units, "one brick" shall represent the length and "half brick" the width of a brick.

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**PS4.2.33.1 Lime**

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

PS4.2.33.2 Cement

Cement shall be as specified in the concrete section.

PS4.2.33.3 Sand

Sand shall comply with the requirements of SANS 1090, unless specialist advice is obtained. A sample of 25kg must be delivered to an approved laboratory for testing purposes.

PS4.2.33.4 Burnt clay bricks

- a) Burnt clay bricks shall comply with the requirements of SANS 227, and shall be equal in all respects to the selected samples.
- b) Clay bricks for foundations shall be as described in (a) above, but extra hard burnt.
- c) Where bricks with holes are used, the holes in such bricks must only be filled in solid with mortar where specifically specified.
- d) All bricks that do not carry the SABS Mark, must be tested by an approved laboratory.

PS4.2.33.5 Firebricks

Firebricks shall be of well burnt refractory fireclay, resistant to spalling and cracking and of same size as ordinary bricks.

PS4.2.33.6 Local stone

Local stone shall be from an approved quarry, free from defects and to the satisfaction of the Employer's Agent or his duly authorised representative.

PS4.2.33.7 Freestone

All freestone shall be the best and most durable of its kind, free from vents, loose beds, oxide veins and other imperfections to the satisfaction of the Employer's Agent or his duly authorised representative and shall be set on its natural quarry bed.

PS4.2.33.8 Mortar tests**a) Sampling**

The frequency of sampling will be decided by the Representative/Agent. Sufficient mortar shall be taken from each of the points of laying to prepare a composite sample to make a set of three mortar cubes.

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b) Moulding

Cube moulds with a nominal size of 100mm, that comply with SANS 5863 must be used.

Fill each mould with mortar in three equal layers and compact each layer by means of a tamper. The tamper must be made of hard wood with a flat tamping surface with nominal dimensions of 50 x 25mm and shaped to provide a round stem of approximately 25mm diameter and long enough to afford sufficient hand grip. Immerse the tamper in water for 15 minutes before use.

Each layer of mortar must be compacted by means of 8 evenly spaced pressing strokes of the tamper. After the final layer has been tamped, the excess mortar must be struck off level with the top edges of the moulds.

c) Curing

Cover the test cubes (in their moulds) with an impervious sheet followed by wet matting, sacks or similar material, and store them in a place free from vibration, excessive draughts and direct sunlight. After 24 hours mark each cube so that it can be identified. After 48 hours the cubes shall be removed from their moulds and placed into water in a curing tank at 22 to 25 °C for a minimum period of 7 days before they are transferred to the approved testing laboratory. Ensure that loss of moisture is prevented during transportation and that they are well protected against damage.

d) Testing of cubes

The testing of all mortar cubes will be done by a laboratory approved by the Employer's Agent and in accordance with SANS 5863.

PS4.2.33.9 Cement mortar

Cement mortar shall be composed of 6 parts (by volume) of sand and 1 part (by volume) of cement. The material shall be mixed dry until of uniform colour and then water added and the mixture turned over until the ingredients are thoroughly incorporated. Cement mortar shall be produced in such quantities as can be used before commencing to set as no cement mortar that has once commenced to set shall be used in any way.

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

Mortar should achieve the minimum required strength (in MPa) for the classes of mortar as set out in the National Building Regulations.

PS4.2.33.10 Compo mortar

Compo mortar shall be composed of 6 parts (by volume) of sand — depending on the quality of the sand available, 1 part of lime and 1 part of cement (by volume). The lime and sand shall be mixed dry, then mixed wet, before the cement is added, approximately ½ hour before using and the adding of the necessary additional water as required.

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

Mortar should achieve the minimum required strength (in MPa) for the classes of mortar as set out in the National Building Regulations.

PS4.2.33.11 Brickwork

Brickwork shall be:

- a) wherever practicable, built in English bond. No false headers shall be used and none but whole bricks employed, except where legitimately required to form bond.
- b) built level and plumb with mortar as specified.
- c) laid on a solid bed of mortar and all joints thoroughly grouted up solid throughout the whole width of each course.
- d) carried up in a uniform manner, no one portion being raised more than 1.2m above another at any one time.

Clay bricks shall be well saturated with water, in the stack or dump, approximately 2 hours before being used. The tops of walls left unfinished shall be well wetted before work recommences.

NOTA BENE: Cement or concrete bricks shall not be wetted.

All rough and fair cutting, cutting of splays, skewbacks, chamfers, etc. shall be properly performed. Form or leave all necessary openings for pipes etc. and make good after pipes etc. are fixed in position.

PS4.2.33.12 Brickwork in cement mortar

- a) All brickwork below damp course level, all isolated piers three bricks wide and under, half brick thick walls and chimney stacks above ceiling level, shall be built in cement mortar as specified.
- b) Brick arches and brick lintels shall be built in cement mortar as specified, but in the proportion of 3:1.

NOTA BENE: This clause is essential where compo mortar has been specified.

PS4.2.33.13 Mortar joints

Mortar joints to brickwork generally shall be 10mm in thickness with level bedding joints.

The joints in brickwork:

- a) receiving plaster, tiling or similar finishes shall be raked out whilst the mortar is soft to form key for the plaster or mortar backing. The depth of the raking out shall depend on the condition of the bricks; i.e. the rougher the bricks on face the shallower the raking out and the smoother the bricks the deeper the raking out.
- b) shall be flushed off where walls are to be bagged, in readiness for the bagging.

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PS4.2.33.14 Grout in joints in brick foundation walls

All joints in brick foundation walls shall be grouted in solid with 3:1 liquid cement mortar to obviate any crevices for ant (termite) tracks.

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**PS4.2.33.15 Brickwork thicknesses**

Walls built in two or three half brick thicknesses shall only be built where bonded brickwork (as specified) proves impractical or where required due to the prescribed bond of faced brickwork, all tied together with metal ties in accordance with SANS 28, of the Butterfly Types only, of sufficient length to allow not less than 75mm of each end to be built into brickwork. Ties shall be evenly spaced at not more than 1m apart to every third course and staggered.

PS4.2.33.16 Brickwork in linings

Brick linings to concrete shall be tied thereto with 4mm diameter galvanized crimped wire ties bent at ends and of necessary length to allow 75mm to be cast into concrete and 75mm of the other end to be built into brickwork and evenly spaced at not more than 1m apart to every third course and staggered.

PS4.2.33.17 Half brick thick walls

Half brick thick walls shall be built in cement mortar (as specified) and reinforced with 75mm wide brick reinforcement (as specified), 1 row to every 8 course in height, and built 100mm into main connecting walls. The reinforcement shall be lapped 150mm at end joints, where these are necessary, and 75mm at angles.

Brickwork shall be built level and plumb.

PS4.2.33.18 Beam filling

Beam filling shall be half brick thick, built up in mortar as used in the walls below, cut in between roof timbers and carried hard up to underside of roof covering and flushed up with mortar.

PS4.2.33.19 Reinforced brick lintels

Reinforced brick lintels shall be built with sound machine made bricks in 3:1 cement mortar with all vertical and horizontal joints filled solid with mortar throughout the required number of courses and to a distance of at least 330mm on either side of the clear opening.

The number of courses in lintels over the various size openings shall be as specified in the table hereunder and reinforcing steel wires or rods shall be built into the first horizontal joint over the bottom course to the number specified in the following table:

Clear daylight span	or	Number of courses	Reinforcement
< 1m		4	One row 75mm wide brick reinforcement as described below, for each brick width of soffit.

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$\geq 1\text{m} \geq 1.5\text{m}$	6	Ditto
$> 1.5\text{m} \leq 2\text{m}$	7	Three 6.3mm diameter mild steel rods for each half brick width of soffit.
$> 2\text{m} \leq 3\text{m}$	8	Ditto

Brick reinforcement shall be of hard drawn mild steel comprising two 2.8mm diameter main wires spaced 75mm apart and 2.5mm diameter cross wires spaced at not exceeding 300mm apart, welded to main wires.

The reinforcing wires and rods shall be of length at least equal to the width of the clear opening plus 330mm at each end. The reinforcement shall be evenly spaced in the brick joints with the outer wires or rods having at least 20mm cover from face of brickwork.

Brick lintels in 270mm thick cavity walls shall be built with inner face of outer thickness, for a depth of three courses above soffit, covered with sheeting as for damp course, the full length of lintels, and space between the two thicknesses for the depth of the sheeting filled in solid with Class E concrete. Where cavities continue above lintels, the sheeting shall be taken up and turned on to top of first course of brickwork to inner thickness of wall above the concrete filling in lintels. The sheeting is not required in lintels protected from the weather.

The lintels, except where built over pressed steel door frames and the like, shall be supported on temporary turning pieces of suitable and substantial construction left in position for at least 14 days for long spans (1 to 3m).

PS4.2.33.20 Hollow tile lintels

Hollow tile lintels shall be formed with approved 300 x 220 x 110mm burnt clay hollow tiles each having not more than 3 cavities. The tiles shall be set end to end and the cavities filled up solid with Class E concrete.

Lintels shall have bearings of not less than 220mm on walls at ends.

The lintels over the various size openings shall be reinforced as specified in the following table:

Clear or daylight span	Reinforcement
$\leq 1\text{m}$	One 12mm diameter mild steel rod in upper and lower cavities
$> 1\text{m} \geq 1.5\text{m}$	One 16mm diameter mild steel rod in upper and lower cavities

The reinforcing rods shall be placed 12mm from top and bottom edges of concrete filling to upper and lower cavities respectively.

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Lintels over openings not exceeding 1m wide in 1 brick thick walls shall be on flat and in all other cases shall be on edge using 2 or more lintels in walls 1 brick thick and over, built side by side, to make up the thickness of walls.

Lintels in 270mm thick cavity walls shall be in two 110mm thicknesses with inner face of outer thickness covered with sheeting as for damp-course, the full length and depth of lintel, and the space between the two thicknesses filled in solid with Class E concrete. Where cavities continue above lintels the sheeting in lintels shall be taken up and turned on to top of first course of brickwork to inner thickness of wall.

Lintels shall be made not less than 21 days before building in and shall be cured for at least 14 days by being kept damp in a shaded position.

The lintels shall be hoisted into position and bedded and grouted in solid in cement mortar.

PS4.2.33.21 Pre-stressed lintels

Pre-stressed lintels shall be vibrated concrete reinforced with stressed high tensile steel wires, or of burnt clay blocks with similar reinforcing wires embedded in grooves in the blocks in 1:3, cement: sand mortar, or of other approved form of construction.

Concrete in lintels shall attain a crushing strength of at least 34MPa at 28 days for ordinary and at 7 days for rapid hardening cement.

The reinforcing wires shall be of ductile high tensile steel wire not less than 4mm diameter and of tensile strength of at least 1,350MPa and shall be stressed to not less than 850MPa.

The lintels may be in a single width to the thickness of wall or may be in two widths, placed side by side, and shall have a depth of not less than 60mm. Top surface of lintels shall be suitably roughened, indented or shaped to give a good bond between the lintels and the mortar for the first course of brickwork above,

Lintels shall have bearings of not less than 225mm on walls at each end.

The number of reinforcing wires in lintels for the various wall thicknesses and spans shall be not less than specified in the table hereunder, and brick courses over lintels of the number indicated in the table and for the full length of lintels shall be built in 3:1 cement mortar with all joints filled solid with mortar:

Nominal wall thickness(mm)	Clear or daylight span	Number of wires (in total number of lintels used)	Number of brick courses over lintel
90 - 110	≤ 1.8m	2	3
90 - 110	> 1.8m ≤ 3m	3	4
180 - 230	≤ 1.8m	6	4

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180 - 230	> 1.8m ≤ 3m	6	5
270	≤ 1.8m	7	4
270	> 1.8m ≤ 3m	7	5
340	As described for 1 of 230mm plus 1 of 110 mm, or 3 of 110 mm		

Lintels in 270mm thick cavity walls shall be in 2 widths with joint between the two arranged directly over the window or frame below, and the brickwork above shall be built in 2 x ½ brick thickness with inner face of the outer thickness covered with sheeting as for damp-course, the full length and depth of lintels, and taken down between the 2 widths of pre-stressed lintels. The cavity to height of lintel courses shall be filled with Class E concrete, and where cavities continue above the lintel courses the sheeting shall be taken up and turned on to top of first course of brickwork to inner thickness of wall above the lintel course. The sheeting is not required in lintels protected from the weather.

PS4.2.33.22 Bagged finish to brickwork

Bagging to walls is to be carried out after the mortar in joints has set. The wall surfaces shall be rubbed over with wet rough sacking until all joints and crevices are filled up and an even surface is obtained. Cement grout shall be added if necessary to fill up the joints and crevices.

PS4.2.33.23 Raking out for and pointing flashings

Brick joints shall be raked out where required for fixing cover flashings and flashings, which shall be pointed in 3:1 cement mortar.

PS4.2.33.24 Mastic pointings

Where steel door and window frames are specified to be pointed with mastic compound they shall be pointed all round externally with an approved waterproofing compound of such composition that it will not stain surrounding surfaces and that it will adhere steadfastly, remain plastic without sagging or running, be capable of accommodating any normal movement of the joint sealed, and will receive paint without "bleeding". The pointing material shall be forced into the joints, which shall have been previously prepared to receive same, by means of a pressure gun or by other suitable method, all in accordance with the manufacturer's instructions.

PS4.2.33.25 Building in

Ends of timbers, holdfasts, cramps, gratings, air bricks, dowels, etc. shall be built-in in cement mortar.

Door and window frames, lift door frames and the like shall be set up in position for building in and securely struttred to prevent distortion whilst the brickwork, lintels, etc. are being built.

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Witness:		Witness:	



Pressed steel door frames and lift door frames shall be grouted in solid at back with cement mortar as the work proceeds. Wood slips, fixing bricks, hoop iron roof ties, etc. shall be built in as the work proceeds.

PS4.2.33.26 Securing of roofs

Roof trusses shall be fixed at each support to walls with ties of 1.6mm thick galvanised hoop iron, 32mm wide, built 750mm deep into brickwork or embedded 300mm deep into concrete or wrapped around bottom layer of reinforcing in a reinforced concrete beam and wrapped over truss and fixed with four galvanised nails, 40mm long

PS4.2.33.27 Bedding

All door, window and similar frames shall be bedded and pointed in 1:3 (cement: sand) cement mortar. All wall and floor plates shall be set true and level and bedded in 1:6 (cement: sand) cement mortar.

PS4.2.33.28 Pointing of brickwork

Clean and point at the end of each working day all exposed masonry work including nail holes, existing brickwork shall be pointed, thus Pointing, repairing eroded and cracked mortar joints, shall be executed on existing and new brick where and when shown by the Employer's Agent or his duly authorized representative. All disintegrated joints (erosions and/or cracks) shall be cleaned of all existing mortar for the full depth of the deterioration but not less than to a depth of 25mm. All joints shall be:

- a) brushed and washed (under pressure) clean prior pointing;
- b) kept wet during pointing; and
- c) pointed to the full depth of the cut, tooled to match existing.

Steel door and window frames shall be carefully pointed all round and made perfectly watertight. Joints greater than 25mm shall be stage-pointed.

PS4.2.33.29 Faced brickwork

Faced brickwork shall be built fair and pointed with a keyed or recessed joint as specified. Keyed joint shall mean that the joints are to be pointed with a round jointing tool, well pressed into the joints as the work proceeds.

"Recessed joint" shall mean that the joints are to be square recessed to a depth of approximately 6mm formed with a rectangular jointing tool well pressed into the joints as the work proceeds.

Facing bricks shall be sorted by the brick manufacturer at his yard or by the Contractor on the site to ensure that proper mixing of the bricks within the colour range of each type of facing brick being used is obtained. Sudden changes in the general colour of face work in any 1 type of facing brick shall not be acceptable.

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PS4.2.33.30 Fibre cement sills

Sills shall where in any way possible be in single lengths, cut between reveals, fitted with fixing lugs and solidly bedded in 1:3 (cement: sand) cement mortar with a slight projection beyond the finished wall face below.

Internal sills shall be level. External sills shall be set sloping on cut brickwork.

Employer:		Contractor:	
Witness:		Witness:	

**PS4.2.33.31 Installation of electrical service**

The installation of electrical services, where such service is being provided, the Contractor shall embed in the concrete, as the work proceeds, all conduits, boxes, etc., which will be fixed in position by the electricians, and must reduce all required chases and holes in walls for conduits and form recesses in walls for distribution boards, all in the positions directed. Alternatively, distribution boards may be built into walls as the work proceeds, providing prior approval are obtained from the Employer's Agent.

The Contractor shall afford every facility and shall render reasonable assistance to the electricians in carrying out their work and shall make good where necessary, in all trades, after installation has been completed.

Chases, holes and recesses required in walls shall be cut and formed as follows:

- vertical chase for single conduit.
- vertical chase for two conduits.
- vertical chase 150mm wide and 110mm deep for conduits.
- vertical chase 250mm wide and 110mm deep for conduits.
- vertical chase 380mm wide and 110mm deep for conduits.
- vertical chase 560mm wide and 110mm deep for conduits.
- horizontal chase for single conduit.
- Holes 25mm diameter, or knocking out bricks and filling space and making good after a pipe has been fixed through a wall.

Recesses for distribution boards shall be:

Width (mm)	Height (mm)	Depth (mm)
330	330	110
455	330	110
635	330	110
610	660	110
610	910	110

PS4.2.33.32 Cable sleeves

Provide under buildings where required 100mm diameter vitrified clay, pitch fibre or plastic pipes as sleeves for electric cable taken up to floor level in cable duct or switch cupboard with easy bends. The pipes shall be as specified for drainage including laying and jointing.

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PS4.2.33.33 Patching brickwork

Patching of existing walls and closing of openings shall be as shown. All brick shall be keyed to the existing or stepped every course with all surfaces flush with the existing surface and all joints kept on line.

PS4.2.33.34 Protect face brickwork

All face brickwork, stonework, tiling, etc. liable to damage shall be covered up and protected during the progress of the remaining work and any damage done shall be made good to the satisfaction of the Employer's Agent or his duly authorized representative.

All face brickwork, stonework, tiling, etc. shall be cleaned down as the work proceeds and shall be covered up with paper, pasted on, or by other approved means where necessary to prevent soiling of the surfaces during the progress of the remaining work. At completion of the works the coverings shall be removed and the surfaces again cleaned down to the satisfaction of the Employer's Agent or his duly authorized representative.

PS4.2.33.35 Cleaning

On completion of the work all masonry must be carefully cleaned down, removing all large particles of mortar with a putty knife or chisel. If acid is required for the removal of mortar stains (see note below), it shall be hydrochloric (muriatic) and not stronger than one volume of the commercial acid to nine volumes of water. Before the acid solution is applied, the surface should be thoroughly soaked with clear water; otherwise the mortar stain may be drawn into the pores causing a permanent dulling of the rich natural masonry colours. The acid solution should be applied with a long-handled stiff Fiber brush, with proper precautions as to covering of clothing, hands and arms to prevent burns. It should not be placed over an area greater than 1.5 to 2.0m² before the wall is again thoroughly washed down, or preferably hosed, with clear water immediately after cleaning. It is important to remove all trace of the acid before it attacks the mortar joint. All frames, trim, sills, or other installations adjacent to the masonry must be carefully protected against contact with the acid solution.

All paving shall be thoroughly cleaned off after laying to remove all traces of mortar and other substances, covered up and protected from damage during the progress of the works and again cleaned off at completion.

Any detergent or other materials used in the cleaning down of face brickwork etc. shall be of such nature that it will not harm adjoining paint and other finishing's in any way.

NOTA BENE: Whenever possible, smooth, light-coloured units should be scrubbed with warm water and soap powder in lieu of acid cleaning.

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Witness:		Witness:	



PS4.2.34 Plastering

PS4.2.34.1 Lime

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

PS4.2.34.2 Cement

Cement shall be as specified.

PS4.2.34.3 Sand

Sand for plaster shall be as specified.

PS4.2.34.4 Form key to concrete for plaster finish

All surfaces of concrete receiving plaster or similar finishes shall be well wetted and wire brushed immediately after the formwork has been removed and slushed over with 2:1 cement grout to form key for the finish, all to the approval of the Employer's Agent or his duly authorized representative. The slushing shall be allowed to set hard before any finish is applied

Where smooth formwork has been used, particular care shall be taken in forming the key for plaster as described in applicable concrete specifications.

PS4.2.34.5 Lime plaster

a) One coat work on walls

Lime plaster for 1 coat work on walls shall be composed of 4 parts (volume) of sand and 1 part (volume) of lime. The material shall be mixed dry until of uniform colour, water shall then be added and the mixture turned over until the ingredients are thoroughly mixed.

Lime plaster not used on the day it is mixed, shall be kept moist until required for use by covering with wet sacks or by other approved means.

b) Two coat work on walls

The rendering coat shall be of compo plaster well scratched over to form key for the setting coat. The setting coat shall be composed of 1 part hydrated putty plaster lime, complying with the requirements of SANS 523 and 1 part fine washed sand, to which retarded hemi-hydrate hard wall finishing gypsum plaster shall be added in the proportion of 1 part of gypsum plaster to 4 parts of sand, all proportioned by volume.

The gypsum plaster shall not be added to the mixture until the setting coat is to be applied and shall then be thoroughly incorporated into the mixture and used immediately.

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c) Two coat work on metal lathing

The rendering coat shall be of compo plaster to which sisal shall be added in the proportion of 4kg of sisal to 1m³ of plaster. The rendering coat shall be well scratched over to form a key for the setting coat.

PS4.2.34.6 Compo plaster

Compo plaster shall be composed of 10 parts (volume) of sand, depending on the quality of the sand available, 1 part (volume) lime and 1 part (volume) cement.

The lime and sand shall be mixed dry until of uniform colour and then mixed wet. Approximately ½ hour before use, add the cement and any additional water as may be required and remix until thoroughly mixed.

Compo plaster shall be produced in such quantities as can be used whilst remaining workable as no compo plaster that has become unworkable shall be used in any way.

PS4.2.34.7 Cement plaster, one coat work on brickwork:

Cement plaster for 1 coat work on brickwork shall be composed of 4 parts of sand to 1 part of cement for internal work and 5 parts of sand to 1 part of cement for external work, all measured by volume, and mixed as described for cement mortar in sub-clause 4.2.19.9 (Cement mortar).

PS4.2.34.8 Thickness of plaster

Plaster on walls shall be not less than 12mm or more than 20mm in thickness and plaster on concrete ceilings and beams shall not be less than 9mm or more than 16mm in thickness.

PS4.2.34.9 Application of plaster

Walls shall be well wetted before plastering is commenced.

The surfaces of plastered walls internally shall be steel trowelled to a smooth, even and true finish, unless otherwise specified.

All external plaster shall be finished to a true and even surface with a wood float, unless otherwise specified. All plaster surfaces shall be free from blemish.

Plaster shall be returned into reveals and soffits of openings and all angles shall be true and straight with salient angles slightly rounded.

The rendering coat of plaster in two coat work shall be approved by the Employer's Agent or his duly authorized representative before the setting coat is applied and notice shall be given to him when the plaster is ready for inspection.

All cracks, blisters and other defects shall be cut out, made good and the whole left perfect at completion.

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PS4.2.34.10 Granolithic finish

Granolithic finish to floors, treads of steps, thresholds and similar horizontal surfaces shall be not less than 25mm thick, composed of 2 parts (volume) granite, or other approved hard stone chippings, or approved hard coarse sharp washed granitic or quartzitic river sand, graded up to a maximum size of 5mm, 1/6 part clean pit sand screened through a 2.4mm mesh sieve and 1 part (volume) of cement, and hand or mechanically steel trowelled to a true and smooth surface.

The material must test between 30 and 35MPa. No dry cement powder or grout shall be applied to the surface.

The granolithic shall be laid before the concrete subfloor has matured otherwise the exposed surface of the concrete shall be thoroughly cleaned with a wire brush and a coat of neat cement grout applied immediately before the granolithic is laid.

The granolithic shall be laid in panels not exceeding 20m² in area and joined to lines of panels with V-joints as directed. The length of any panel shall not exceed 4.5m and wherever possible the joints between the panels shall coincide with any joints in the concrete sub-floor.

Where granolithic is to be tinted, it shall be laid in two thicknesses in one operation, the lower thickness being brought up to within 6mm of the finished level and the upper thickness, into which the requisite quantity of approved colouring material has been mixed, shall be laid. NO DUSTING OF COLOURING MATERIAL SHALL BE ALLOWED.

Granolithic finish to stair risers, sides of kerbs and other vertical surfaces shall be not less than 12mm thick.

Exposed salient angles of granolithic shall be neatly rounded to approximately 20mm radius.

All granolithic work shall be carried out by experienced workmen and shall be protected from injury caused by rain or other extremes of weather for 12 hours after being laid, and against drying out too rapidly whilst hardening by covering with wet sacks or other suitable material and shall be protected from other injury and discoloration during the progress of the remaining work.

Edges of granolithic floors adjoining other floor finishes, edges of margins, etc. shall be true and sharp, all protected by fixing temporary wood strips which shall remain in position until laying of the adjoining flooring material is commenced.

PS4.2.34.11 Reeding to steps and upper surfaces

The treads of steps and upper surfaces of external thresholds finished with granolithic or sand-cement finish shall be rendered non-slip by reeding same near front edge for a width of 100mm and stopped 100mm from ends.

PS4.2.34.12 Polishing of granolithic

All tinted granolithic finishes to floors, steps, thresholds, skirting, etc. shall at completion of all other work be twice polished with wax floor polish of an approved type.

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**PS4.2.34.13 Screeding to floors**

Concrete sub-floors finished with wood mosaic, semi-flexible tiles and fully flexible vinyl sheeting and tiles and similar finishes shall be screeded with 1:3 (cement: sand) cement plaster of thickness required, but in no case less than 12mm, all steel trowelled to true and smooth surfaces. The sand used in the plaster shall be of such fineness as will allow for the screed being trowelled to a surface suitable to receive the finishes.

The screeding shall be laid before the concrete sub-floors have matured, otherwise the exposed surfaces of the concrete shall be thoroughly cleaned with a wire brush and a coat of neat cement grout applied immediately before the screeding is laid.

The screeding shall be laid in good time, but no finishes are to be laid if the screed exceeds 70% moisture content when measured with a hygrometer.

No traffic shall pass over nor shall any building operations take place on the screeding unless a proper protective covering is first provided.

NOTA BENE: A similar process shall be applicable where manholes or chambers are screeded.

PS4.2.34.14 Sand-cement finish

Sand-cement finish to treads of steps, thresholds, etc. shall be of 1:2 (cement: sand) cement plaster not less than 20mm thick and steel trowelled to true and smooth surfaces. Finishes to risers of steps, sides of kerbs and other vertical surfaces shall be not less than 12mm thick. Exposed salient angles shall be neatly rounded to approximately 20mm radius.

PS4.2.34.15 Natural aggregate concrete floor hardener**a) Definition**

All natural aggregate hardeners for concrete floors shall consist of a factory prepared blend of clean, properly graded and oven dried natural aggregate, Portland cement and chemical aids, all suitable for monolithic application to the surface of newly placed concrete. Where required the hardener may contain certain compatible pigments for tinted floors.

b) Quality testing**i) Sampling:**

A minimum of 1% of every 5 tons of production shall be sampled and factory tested for water demand, compressive strength and proportioning.

ii) Compressive strength and water demand

Mix with sufficient water to give a slump of 20 to 25mm in a 35 x 90 x 75mm high slump cone filled in three layers; tamping each layer with 15 strokes of a 16mm diameter rod, shall give the following minimum compressive strengths when tested in a 70mm mortar cube vibrated for 3mm on a vibrating table and stored in a curing room or tank at 22 to 25°C and not less than 90% humidity:

- at 7 days : 50 MPa

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- at 28 days : 70 MPa

iii) Test records:

Each quality test record shall be so referenced that the batch numbers on bags of the product may be traced back to the relevant quality control report. Such reports shall be available for inspection by the Employer's Agent or his duly authorized representative for up to 1 year after manufacture.

c) Curing

As an integral part of this hardener, a membrane curing compound, which must be both compatible with the floor hardener offered and comply with the ASTM C.309 Type 1 specification for moisture retention, shall be used.

PS4.2.34.16 Ferrous aggregate concrete floor hardener

The ferrous aggregate hardener for concrete floors shall be a factory prepared blend of clean, properly graded ferrous metal aggregate, Portland cement and chemical aids for application and hardening, ready to apply as a dry shake to the surface of newly placed concrete before finishing. The ferrous aggregate shall be guaranteed to be free of matter deleterious to concrete, such as oil and non-ferrous particles and shall be treated for rust inhibition. Where required it may contain compatible pigments for tinted floors.

PS4.2.35 General product requirements

PS4.2.35.1 Local content

Preference shall be given to materials fully manufactured in South Africa with South African raw materials.

PS4.2.35.2 Site service

The manufacturer shall be expected to supply samples free of any other additional charge, and the services of a qualified technical representative on all of the building sites pertaining to the particular contract in order to train the placing team in the correct application methods of the product during initial placing upon 1 weeks' notice.

Circumstances may necessitate follow-up inspections.

PS4.2.35.3 Shelf life

The shelf life of the offered product shall be stated and the expiry date displayed on each bag. The Contractor shall ensure that the product supplied will survive the Contract Period, or replace the product at his cost.

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**PS4.2.35.4 References**

The Contractor shall submit names and locations of projects in South Africa where the offered product has been in successful use for a period of at least 5 years under similar conditions and at similar rates. The Contractor shall:

- i) make arrangements with the project owners for access for such visits, if the Employer's Agent or his duly authorized representative wish to inspect such reference project sites.
- ii) provide an acceptable alternative at the same accepted financial rate of the original proposed product, should the Employer's Agent or his duly authorized representative find the product unacceptable.

PS4.2.35.5 Approved products

Only products that have been tested and which have been approved by the SABS shall qualify.

PS4.2.35.6 Application rates

As specified by the manufacturer.

PS4.2.35.7 Control testing

The Contractor shall be required to conduct control testing as and when requested by the Employer's Agent or his duly authorized representative, proving the quality of the product used.

PS4.2.36 Specific work-related instructions**PS4.2.36.1 Contractor's responsibility**

The Contractor shall be held responsible for damage to street or road surfaces, kerbing, stormwater drainage channels (gutters), existing utilities, etc. that result from his negligence during any survey. The Contractor shall repair, at his cost, any damage resulting there from, which shall be subject to approval by the owner of such asset and the Employer's Agent or his duly authorized representative.

PS4.2.36.2 No disturbance

The Contractor shall be required to perform Works at all conduits with limited and approved disturbance to the existing service provision. Should the Contractor decide to use a stringing method to survey the conduit, the stringing lines shall not be left in the conduit for more than 5 days or without consent of the Employer's Agent or his duly authorized representative.

PS4.2.36.3 Immediate danger

All obstructions, cracks, irregularities must be fully surveyed and documented. The Contractor must inform the Employer's Agent immediately of any obstruction encountered, locations of hazardous atmosphere, or conduits that are in immediate danger of structural failure. Where possible:

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- a) the survey shall be done from the opposite side, whilst appropriate health and safety measures are adhered to, so that the extent of the danger can be assessed.
- b) the position shall be clearly and accurately marked, to allow operations and maintenance to easily locate the position.

PS4.2.49 Removal of damaged pipes

All pipes that have been removed from the excavations are spoiled within 48 hours of excavation failing which the Employer's Agent shall be entitled to suspend work under the Contract.

The rate shall include the complete (labour, plant and equipment) cost for the removal of such material.
Unit: m

PS4.2.50 Trenchless technology

PS4.2.50.1 Supply and Installation of pipe through pipe cracking **Unit: m**

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful pipe cracking of the pipe, installation and supply of pipes of various diameters, jointing of pipe, launching and reception pits. The rate shall also include the provision and operation of all equipment and accessories, provision and application of all materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation and testing and reporting.

PS4.2.50.2 Supply and Installation of pipe through Horizontal Direction Drilling (HDD)
Unit: m

The rate shall include the complete (labour, qualified operators, material, plant and equipment) cost for the successful drilling of the pipe, installation and supply of pipes of various diameters, jointing of pipe, launching and reception pits. The rate shall also include the provision and operation of all equipment and accessories, provision and application of all materials, safety equipment (including that required for the Employer's Agent or his duly authorised representative's sole use), traffic accommodation and testing and reporting.

PS 4.3 PLANT AND MATERIALS

The Contractor is required to provide all plant and materials necessary to carry out the works as specified and required. No additional allowances other than those already specified in the Schedule of Rates shall be allowed for with respect to plant and materials.

PS 4.4 ENGAGEMENT OF LABOUR

PS 4.4.1 Provision of a Temporary Workforce for the Contract

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The Contractor shall have regard for the stipulation laid down for all Labour Intensive projects that he employs labour from the local community through the Labour Desk that has been established for this purpose.

The Labour Desk shall assist in identifying available local labour and, where available, semi-skilled labour as well as local sub-Contractors. The Labour Desk shall also assist and advise regarding conditions of employment, minimum wages, disputes and disciplinary procedures.

The workforce that is employed on Site shall consist of local labour where applicable, except for approved key staff, to the extent that is compatible with the requirements of Clause 4.11 of the General Conditions of Contract 2015.

The Occupational Health and Safety Act must be adhered to with reference to the safety of any employee irrespective of whether such employee is employed by the Contractor or by a local sub-contractor. Furthermore, a contract of employment must be signed between the Contractor and each of his employees and sub-contractors and between such sub-Contractors, and each of the sub-contractor's employees with clear reference to the following conditions:

- The minimum agreed wage rate per hour in respect of labourers;
- The agreed pay rate per unit of production where applicable;
- UIF and WCA payments;
- Minimum working hours per day;
- Start and end times of a daily shift;
- Lunch break times;

Company Policy regarding the following:

- Rain time
- No work no pay - sick, absent
- Disciplinary policy
- Grievance policy
- Method of payment
- Workers' clothing and safety equipment to be issued.
- The Contractor is required to show these items to the Employer's Agent for approval before construction commences.

PS 4.4.2 Transportation of labourers

The labour employed on this contract shall be local labour from the nearest local community. Transportation should be provided for the labourers from Site Office to where they are working and back to the Site Office arranged from their homes to the site.

PS 4.4.3 Minimum wage for local labour

Contractor to comply with the latest Government Gazette: Basic Conditions of Employment Act 75 of 1997 from Department of Labour.

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PS 4.4.4 Training

The Contractor will be expected to provide formal training for the labourers. In this regard the labourer will be attending training for five days and the labourers should receive their full salary while on training. The Contractor is expected to have allowed for this in his rates.

PS 4.5 EXISTING SERVICES

PS 4.5.1 Known services

Existing known services, both underground and overhead, are indicated on the drawings, but the positions of existing services on the drawings are not guaranteed nor does the Employer or the Employer's Agent accept any liability in this regard.

The Contractor shall make himself acquainted with all existing services such as storm water drains, water mains, power lines, cables, gas pipelines, telephone and lighting poles, water meters, stopcock boxes, valve boxes, hydrants, air mains, trees, sewers, electricity cables, telecommunication cables etc. before any excavation commences. Special care and due diligence shall be exercised when working adjacent to the abovementioned existing services.

Under no circumstance is the Contractor to alter or in any way interfere with existing works or underground services unless authorised by the Employer's Agent.

Where, in the opinion of the Employer's Agent and if ordered by him, there is sufficient uncertainty as to the existence of, or the position or depth of any underground services, the Contractor shall first make use of specialist equipment such as ground penetrating radar before carrying out exploratory excavations using hand tools, in order to obtain the required information without causing damage. Exploratory excavations shall be carried out, refilled and reinstated in an approved manner as expeditiously as possible. Where existing works are of such a nature that the Employer's Agent may require them to be moved by the Contractor, the cost of such work will be paid for at scheduled rates or on a Day works basis.

The Contractor shall excavate by hand, trial pits to ascertain whether there are any services existing within the relevant section of the site. The Contractor shall complete such an investigation well in advance of the start of construction work in the said section and he shall submit a report in good time to the Employer's Agent.

Any deviation of the positions of such services must be reported to the Employer's Agent immediately. Should the Contractor find underground services that are not indicated on the construction drawings at all, the Employer's Agent shall be immediately notified. In both cases the Employer's Agent shall assess the situation and instruct the Contractor on an appropriate course of action to be taken.

All cables and pipes shall be considered "live" unless confirmed otherwise by the relevant authority.

The Works must be scheduled and programmed so that when work is disrupted due to the influence of unexpected services encountered, construction can continue in other portions of the site to allow the situation to be remedied by rerouting of new or existing services. The Contractor shall restore to its original condition any structure or service with which there has been temporary interference.

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PS 4.5.2 Treatment of existing services

The Contractor must liaise with all relevant local authorities to satisfy himself that all relevant services have been located. At the commencement of the contract, the Contractor must hand excavate a distance 0, 5 metre on each side of the located service to expose it. The exposed service shall be identified and recorded on a drawing.

A copy of the drawing with all known services shall be submitted to the Employer's Agent before construction can commence in any road reserve. Once the exposed service is identified and recorded the excavation must immediately be backfilled. Re-excavation by hand at construction stage will not be measured in addition to normal trench excavation.

The Contractor shall retain full responsibility for establishing the exact positions of the various services in advance of any construction work. No allowance for delays or disruption shall be entertained unless the Contractor complies fully with the provisions of this clause regarding the establishment of the exact positions of the various services in advance of any construction work.

PS 4.5.3 Use of detection equipment for the location of underground services

The Contractor is responsible to provide his own equipment in order to determine the location of existing services and shall locate and expose existing services by hand.

PS 4.5.4 Damage to existing services

The Contractor

must make provision for the possible existence of numerous services within and in close proximity to the work areas;

shall take necessary steps to protect any existing services whatsoever against damage which may arise as a result his operations on site. Adequacy in terms of protection of existing services shall be at the discretion of the Employer's Agent. The Contractor is to make good the protection of and any breakages to existing services;

must inform the relevant service provider immediately (within 2 hours of the incident) such that procedures for the re-instatement of the service can be effected, should he damage or break an existing service (whether known or unknown);

shall bear the cost of the repair of damages to any service, the possible existence of which could reasonably have been ascertained by him in good time.

Under no circumstance is the Contractor to alter or in any way interfere with existing works or underground services unless authorised by the Employer's Agent.

NOTA BENE: Drawings indicating other existing services in the vicinity of the Works are not guaranteed as being accurate, as all other services may not have been recorded or properly recorded. It shall remain the responsibility of the Contractor to perform preoperational work, to locate existing services in advance of the commencement of the Works.

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PS 4.6 SITE ESTABLISHMENT, FACILITIES AVAILABLE AND REQUIRED

PS4.6.1 General

In order to facilitate compliance with the General Conditions of Contract and Conditions of Contract the Contractor shall be required to set-up an individual construction camp. The size and functionality of the site camp shall be in relation to the individual Blocks and Sections. It is, however, expected that the Contractor would have made themselves aware on whether one or multiple site camps are required for the execution of the complete Contract Works.

The Contractor shall price accordingly and state so in their proposal. For the camp/s, the following shall apply:

- a) The Contractor shall make arrangements with the relevant authority for a suitable site to establish a construction camp, storage, works offices, workshop/s, kitchen, and shelters for security personnel.
- b) The Contractor shall note that only security personnel shall be permitted to remain in the campsite overnight.
- c) Ablution facilities shall be provided for men and women separately. One toilet per twenty workers shall be provided. Such facilities shall at all times be maintained in a clean and hygienic condition. Toilets shall be screened from public view and their use shall be enforced.
- d) Covered accommodation shall be provided for perishable or corrodible materials, fittings and the like and shall be adequate and suitable for their purpose. In the case of cement stores, they shall be well ventilated, weatherproof and waterproof with appropriate floors to keep the materials dry and freely aerated.
- e) All such accommodation shall be subject to the approval of the Employer's Agent who shall have free access thereto at all times.
- f) Temporary buildings and fencing are to be safe, neat and presentable and the surrounding areas must at all times be kept in a neat, clean and orderly condition for the duration of the Works.
- g) It shall be the Contractor's responsibility to ensure that they are in compliance with all relevant laws and regulations as well as tribal requirements.

PS4.6.2 Site facilities required for Employer's Agent

- a) Source of water supply: It will be the responsibility of the Contractor to make his own arrangements for the supply of water. Potable water is available in the area and the Contractor is to make the necessary arrangements for the provision of a metered point of supply with the Employer. The sum entered by the Contractor in the Bill of Quantities for provision of water shall be deemed to include full compensation for the procurement, transport, storage (where necessary), supply and application of water and for all the work necessary and incidental thereto for the various items of work where water is required for the purposes of the contract.
The Employer does not guarantee the availability, sufficiency or continuity of any supply and no claims in this regard will be considered.

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The Contractor is to be aware of the fact that this Contract is to be carried close to a built up environment and that, as such, excessive dust creation will be considered unacceptable by the local residents. The Contractor is to make provision for regular watering of the works in order to alleviate dust creation. During dry weather, or during periods when dust is created by the construction process, the Contractor will be required to water the works a minimum of twice a day, or as specified by the Employer's Agent. This is a requirement over and above the normal requirement for watering of the works.

- b) Source of power supply: It will be the responsibility of the Contractor to make his own arrangements for the supply of electricity. The sum entered by the Contractor in the Bill of Quantities for the provision of power shall be deemed to include full compensation for the procurement and supply of powers to the works. The Employer does not guarantee the availability, sufficiency or continuity of any supply and no claims in this regard will be considered.
- c) Contractor's camp: A suitable site for the Contractors camp will be identified prior to commencement by the Employer. The Contractor is to make the necessary arrangements for the payment of services to the Municipality where applicable. The camp site shall be kept clean and tidy, and at the completion of the contract shall be restored to its original condition at the Contractor's own cost, and to the satisfaction of the Employer's Agent. In order to facilitate compliance with the Conditions of Contract and the Specification, the Contractor may establish storage accommodation, works offices, workshops, mess-rooms, kitchens, shelters for watchmen, latrines, ablutions and the like in such positions and under such conditions as may be agreed by the Employer's Agent and indicated in the Addendum to the EMP.

Temporary buildings and fencing are to be neat and presentable and the surrounding areas must at all times be kept in a neat, clean and orderly condition.

The Contractor shall not make any excavation without written permission of the Employer's Agent.

Covered accommodation for perishable or corrodible materials, fittings and the like shall be adequate and suitable for their purpose, and, particularly in the case of cement stores, shall be well ventilated, weatherproof and waterproof with floors raised off the ground, so as to keep the materials perfectly dry and freely aerated. All such accommodation shall be subject to the approval of the Employer's Agent who shall have free access there at all times.

- d) The Contractor may not house members of his permanent staff except for a security guard at the site and is to make the necessary arrangements for the transport of his staff members to and from the site on a daily basis. As the Contractor's Camp may be located in close proximity to a residential area, attention to noise levels, particularly after hours, will be essential.
- e) Site facilities required for Employer's Agent and others: The requirements of the Employer's Agent's Site Establishment are detailed in Project Specification PSA and PSAB.

PS 4.7 SITE USAGE

PS4.7.1 Work on private or state property

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The Contractor is to confine his activities strictly to the working area defined as being within 10 m on either side of the pipelines, spoil sites and the direct access roads to these. He shall not encroach upon any roadway except with the prior approval of the Employer, in writing. The Contractor shall, throughout the Contract, take adequate precautions to protect all existing services from damage whether or not they have been pointed out to him.

Shallow sewer connections are to be found at the rear of the mid-block latrines. Particular care shall be exercised when excavating behind these structures. Underground electric cables are to be found on all erven at depths of between 75 and 1000 mm. Typically, these cables are at a distance of up to 1200 mm parallel to the erf boundaries and perpendicular to the common boundaries where they connect to the houses. Cables may also be encountered along the boundary behind the latrines. Particular care should be exercised when excavating in the vicinity of these cables.

The Contractor shall, as soon as is practically possible, inform the Employer's Agent of any damages to services and shall not repair any such damage unless instructed to do so. The Contractor shall be responsible for making good, at his own cost and to the satisfaction of the Employer's Agent, all damage caused by him to buildings and other improvements to properties.

Should the Contractor consider that damage to buildings and structures is unavoidable in the execution of any portion of the Works, he shall obtain the approval of the Employer's Agent before proceeding with the work. Where damage is noticed before commencement of work on that erf, this should be reported to the Employer's Agent in order to prevent a possible liability claim from the owner.

PS4.7.2 Site safety and precautions against nuisance

The Works are to be conducted in an urban area where high volumes of pedestrian and vehicular traffic may prevail. The watching, barricading, lighting and traffic control on site shall be carried out in strict compliance with these specifications. The Contractor shall ensure that all safety measures are strictly adhered to. The Contractor shall ensure that excavations on sidewalks within the road reserves or within the erven, do not at any time present a safety hazard to pedestrians. All excavations that remain open overnight are to be adequately protected.

The Contractor shall provide all safety materials and equipment necessary for barricading and safeguarding the excavations. The safety of staff and labour involved with the Works and the security of installations, plant and equipment is of major concern and need special attention during the execution of the Works.

Plant used on the Works shall be as efficiently silenced as possible and noisy operations will be permitted only between the hours of 07:00 and 17:00. Any work outside normal hours will be permitted only on the written authority of the Employer's Agent. Wherever excavations or loading of material is liable to form dust, an effective method of spraying water over the excavated area and loaded material shall be instilled. Any rock or debris falling from trucks on the roads shall be removed immediately. Precautions shall be taken to prevent fouling of public roads or private surfaces. The Employer's Agent may order the Contractor to broom off and clean roads or surfaces where debris may constitute a danger to the public or a nuisance to the owners.

PS4.7.3 Work on live water mains

Every effort will be made by the Johannesburg Water to furnish the Contractor with all available information regarding existing reticulation systems. Such information is given in good faith. Actual conditions in the field may, however, vary from the records upon which information is based. The Contractor must allow in his programme for delays when working on live mains and, as far as

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possible, such work should not be on the critical path of any programme and every effort must be made to have alternative work available.

PS4.7.4 Flushing and cleaning of water mains

On satisfactory completion of work, the mains shall be flushed with potable water supplied by the Council. The Contractor shall ensure that the water used for flushing is disposed of in an approved manner without damage, nuisance or injury to person or property. The Contractor shall allow in his rates for all costs associated with the flushing of water mains and communications pipes, save the cost of the water used. All water required for the flushing of water mains shall be supplied free of charge by the Johannesburg Water. If, in the opinion of the Employer's Agent, foreign material has entered or remained in pipelines, the Contractor shall arrange for the water mains to be cleaned. The cost of cleaning including the cost of water used, shall be for the Contractor's account.

PS4.7.5 Work outside normal working hours

In accordance with General Conditions of Contract Clause 5.8.1, certain work may only be done outside normal working hours. Such work shall be undertaken solely at the discretion of the Employer's Agent who shall, from time to time, issue advance orders in writing to the Contractor detailing the work to be undertaken. Work undertaken, as ordered, outside normal working hours shall be measured and paid for at the rates applicable to each and every item carried out as scheduled.

Normal working hours shall be defined as between 07:00 and 17:30 Mondays to Fridays and also 07:00 to 13:00 on Saturdays.

Where the Works are conducted within the road reserve of major arterial roads, the contractor's operations will be restricted to out-of-peak traffic periods (typically 09:00 to 15:30) or as determined by the Traffic Department. The Contractor shall co-ordinate his activities in such a manner that only minor operations that are non-disruptive to traffic are carried out during peak traffic periods. Should the Contractor choose to work outside normal working hours without having been ordered to do so by the Employer's Agent, permission will not be unreasonably withheld but all additional costs arising out of such work shall be entirely to the Contractor's account.

PS 4.8 PERMITS AND WAYLEAVES

The Contractor will be required to obtain in his own name from all the applicable service providers within the jurisdiction of the CoJ, thus including the following services:

- Johannesburg Water.
- City Power.
- City Parks.
- Eskom.
- Telkom.
- Rand Water.
- Egoli Gas.
- Sasol.
- Neotel.
- Dark Fibre Africa.
- MTN.
- City Connect.
- Johannesburg Roads Agency.
- Others which may be identified.

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The Contractor shall maintain and comply with all conditions of wayleaves for the duration of the Contract.

The Employer will assist the Contractor to obtain clearance from the various departments with services that are likely to be affected by the Contract. It is, however, the Contractor's responsibility to obtain final permit and wayleave approval according to applicable procedures and specifications. In the case of JRA, this will be as per the CoJ COP. Further, a processing fee per wayleave will be payable by the Contractor to cover the cost of processing and approval of the JRA wayleave applications.

All associated costs to obtain permits and way-leaves as required for the execution of the works, where such affect other services, shall be deemed to have been included in the scheduled rates for SANS 1200A or SANS 1200AA or SANS 1200AB where pricing provision for such items have been allowed for in the pricing schedules, alternatively it shall be deemed to be included in the various scheduled activity rates or prices provided by the Contractor.

NOTA BENE: No extension of time shall be granted for this process.

PS 4.9 ALTERATIONS, ADDITIONS, EXTENSIONS AND MODIFICATIONS TO EXISTING WORKS

The Contractor shall, within 20 working days or 10 % of the construction period after taking possession of the site (whichever is the lesser), satisfy himself that the dimensional accuracy, alignment, levels and setting out of existing structures or components thereof are compatible with the proposed works, and notify the Employer of any areas of dissatisfaction.

The Contractor shall, on becoming aware of a defect in existing works which will have an impact on the current works, notify the Employer of such a defect without delay.

The water mains of the existing network would have to be modified slightly to facilitate the connection of the new water main installation.

PS 4.10 INSPECTION OF ADJOINING STRUCTURES, SERVICES, BUILDINGS AND PROPERTIES

The Contractor shall, before commencing with works which have the potential to damage surrounding structures, services, buildings or property, arrange an inspection with the owners of such structures, services, buildings and property and representatives of local or controlling authorities, as appropriate, to determine the condition of buildings, structures, services, paved surfaces, roads, kerbs, channels and the like, that the works could affect, and document their current condition in sufficient detail to enable disturbances or damage which might be caused by the works to be evaluated. The Contractor shall furnish the Employer with copies of all such documentation and shall be held responsible for any disturbance and damage to such structures, services, buildings and property arising from the performance of the contract as well as any costs involved in refuting or processing such claims.

PS 4.11 WATER, SANITATION AND ELECTRICITY FOR CONSTRUCTION PURPOSES

PS4.11.1 Water

The Contractor shall make his own arrangements with the Employer to obtain a potable water metered standpipe connection for which at least 14 days' notice shall be given. The size of the connection provided will be as specified in the Water and Sanitation By-laws.

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The Contractor may only draw water from fire hydrants through means of a legal, Employer owned, potable water metered standpipe. Failure to use such Employer owned potable water metered standpipes, or using illegal, non-Employer owned equipment for purposes of drawing water from fire hydrants, will result in the Contractor having to pay an account to the Employer, for an amount determined by the Employer

The potable water metered standpipe(s) must be made available to the Employer's water inspectors for purposes of reading and inspection, and failure to do so, will result in the immediate withdrawal of such potable water metered standpipe(s). The onus is on the Contractor to return such potable water metered standpipe(s) if they are found to be defective (not registering consumption). Failure to do so will result in an account being levied, payable to and determined by the Employer. Claims for delays caused where standpipe(s) are withdrawn and/or replaced will not be considered.

The current water tariffs applicable to the Contract are available from the Employer.

PS4.11.2 Sewer

The Contractor shall provide, maintain, move to positions as required and finally remove proper sanitary accommodation at each work front. Sanitary accommodation shall be properly screened and its use strictly enforced. The Contractor shall comply with the Employer's Sanitation General By-Laws Section 19(1) and 19(3).

The situation of sanitary accommodation prescribed in terms of the Sanitary General By-Laws shall be approved by the Employer's Agent as being convenient for the person for whose use it is intended. The sanitary accommodation provided must be adequately ventilated, properly disinfected and kept in a thoroughly clean condition at all times.

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

PS4.11.3 Power

The Contractor shall make arrangements with the relevant authority for the supply and distribution of power for purposes of this Contract, the cost of which shall be deemed to be included in the rates inserted in the Schedule of Rates.

Power used for carrying out of the works in accordance with these Specifications will not be subject to measurement or payment.

PS 4.12 SURVEY CONTROL AND SETTING OUT OF THE WORKS

The Contractor is to confirm the levels and coordinates of all benchmarks prior to commencing with construction.

The Contractor shall, prior to the ordering of pipe fittings, set out the works strictly according to the Employer's Agent's construction drawings and/or site instructions.

The Contractor shall record the setting out of the works in an approved format and order all required pipe fittings accordingly.

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PS.5 MANAGEMENT OF THE WORKS

PS 5.1 Applicable SANS 1921 Standards

The Standards applicable to this Contract shall be: SANS 1921-1: 2004 first edition:
Construction and Management Requirements for works Contracts: Part 1: General
engineering and construction works

PS 5.2 Planning and Programming

No deviation from the approved sequence of construction shall be accepted without prior written approval.

The programme shall be in the form of a bar chart and shall show clearly the anticipated quantities of work to be performed each month, together with the manner in which the listed plant is to be used, as well as the cash flow for the various sections of work.

1. Sequence of the works for the relevant works area.
2. Target dates for the tasks identified in sequence of the works for the relevant works area
3. Materials requirements.
4. Construction Plant to be used.
5. Services affecting construction
6. Any factors that could affect construction progress after commencement.

The method statement shall be approved by the Employer's Agent before commencement of construction. In order to minimize the impact on traffic, pedestrians and business the Contractor will be required to segment the works in such a manner that no portion of the works is more than one day ahead of the following position i.e. trenches cannot be excavated more than one day ahead of pipe laying, pipes more than one day in advance of manhole construction and finishing off etc. These segments of the works shall be clearly defined in the Contractor's method statement for each work area.

If, during the progress of the work, the quantities of work performed per month fall below those shown on the programme, or if the sequence of operations is altered, or if the program is deviated from in any other way, the Contractor shall, within one week after being notified by the Employer's Agent, submit a revised programme.

If the programme is to be revised by reason of the Contractor falling behind his programme, he shall produce a revised programme showing the modifications to the original programme that are necessary to ensure completion of the Works or any part thereof within the time for completion. Any proposal to increase the rate of work shall be accompanied by positive steps to increase production by providing more labour and plant on the Site, or by using the available labour and plant in a more efficient manner.

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

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The approval by the Employer's Agent of any programme shall have no contractual significance other than that the Employer's Agent would be satisfied if the work is carried out in accordance to such programme and that the Contractor undertakes to carry out the work in accordance with the programme. It shall not limit the right of the Employer's Agent to instruct the Contractor to vary the programme should circumstances make this necessary.

Where the Contractor's programme indicates completion beyond the official contract completion date, and the programme is accepted by the Employer's Agent, such acceptance shall in no way whatsoever indicate the Employer's Agent's acceptance of an extension to the contract period. Nor shall it be acceptable in terms of Clause 5.6.5 of the General Conditions of Contract as notification of an intention to claim. It shall, however, indicate that the Contractor has taken due cognizance of the completion date and of the consequent possible application of penalties.

PS 5.2.1 Planning

The Contractor shall ensure that he delivers good and services timeously, to not unnecessarily delay other contractors, service providers and suppliers.

PS 5.2.2 Programming

The Contractor shall provide and regularly (maximum monthly) update a Contract Programme. The programme shall at minimum contain:

PS 5.2.2.2.1 Time Scale (minimum):

- i. Days, where the period does not exceed three months.
- ii. Weeks, where the project period exceeds three months.
- iii. Months, where the period does not exceed one year.
- iv. Years, where the project period exceeds one year

PS 5.2.2.2.2 Tasks:

Where phases or stages are anticipated, this shall be the highest level of division and all tasks related to the successful accomplishment of that phase of the area shall be grouped. Resources allocation and task dependency shall be indicated.

PS 5.2.2.2.3 Start and Finish Dates:

All tasks shall have specific start and finish dates.

PS 5.2.2.2.4 Critical Path:

All tasks forming the programme line that will establish any delays in the overall Contract Period shall be clearly indicated and an indication of their sensitivity characteristics shall be provided.

PS 5.2.2.2.5 Progress Tracking:

The Contractor shall be required to periodically indicate progress per task graphically and on a percentage basis.

PS 5.2.2.2.6 Non-working Time:

South African public holidays, weekends and the local traditional annual builder's break shall be incorporated in the programme.

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PS 5.2.3 Sequence of the works

The sequence of works to be executed shall be agreed between the Employer's Agent and the Contractor.

PS 5.2.4 Software application for programming

The construction programme shall be completed in Microsoft® Project Standard 2010 or compatible software. The construction programme and updated versions thereof shall be made electronically available to the Employer's Agent.

PS 5.2.5 Methods and procedures

The methods and procedures for the execution of the works shall be in accordance with the standard specifications and the variations and additions thereto.

PS 5.3 Quality plans and control

The onus to produce work that conforms in quality and accuracy of detail to the requirements of the specifications and drawings rests with the Contractor, and the Contractor shall, at his own expense, institute a quality-control system and provide experienced personnel, together with all transport, instruments and equipment to ensure adequate supervision and positive control of the works at all times.

The cost of supervision and process control will be deemed to be included in the rates tendered for the related items of work.

On completion and submission of every part of the Works to the Employer's Agent for examination, the Contractor shall furnish the Employer's Agent with proof of quality in the form of a data pack containing measurements and levels to indicate compliance with the scope of work.

Notwithstanding anything contained in this document, nor any examination of the Works by the Employer's Agent, nor any tests carried out, nor any approvals granted (verbally or in writing), nor any consent that may have been given, either directly or implied, nor anything that may be construed to the contrary, the Contractor shall remain fully and solely accountable for correctly setting out, founding and constructing the Works, and for compliance with the specifications and the drawings.

PS 5.4 Other contractors on site

During the course of the contract, other contractors may be involved in construction projects within and in the vicinity of the site, which may be inter-related to the work being undertaken on this contract.

The Contractor shall cooperate with other such contractors and shall provide them with all reasonable access to enable them to carry out their work. Access may be required, from time to time, by these contractors and the Contractor shall take all reasonable steps to accommodate such requirements.

No claims, related to works being carried out by other contractors, will be entertained by the Employer.

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PS 5.5 Testing, completion, commissioning and correction of defects

PS 5.5.1 General

The onus is on the Contractor to produce work that will conform in quality and in accuracy of detail to the requirements hereinafter specified. The Contractor shall clearly understand that it is not a duty of the Employer's Agent or his representative to act as foreman or surveyor on the Works.

The Contractor shall, at his own expense, provide an experienced Site Agent, foremen and surveyors together with all transport, instruments and equipment for supervising, checking and controlling the work.

The act of passing any completed work for payment by the Employer's Agent shall not be construed as signifying approval or acceptance thereof. Failure on the part of the Employer's Agent to reject any defective work or material shall not in any way relieve the Contractor of his obligations under the Contract, nor prevent later rejection when such work or material is discovered. In this regard, it is emphasised that notwithstanding anything contained in this document, any tests that may have been carried out, any consent that may have been given, either directly or implied, and anything that may be construed to the contrary, the Contractor shall remain fully and solely accountable for the Works and for compliance with the specifications and the drawings.

The Contractor shall, when submitting any work to the Employer's Agent for examination, satisfy himself by testing, measurement and otherwise as may be necessary that the work does in fact meet with the requirements of the Specifications. This information shall be submitted with the Contractor's request for examination and the Employer's Agent shall decide on the number and type of tests, measurements, etc. required to enable him to judge the quality of the work. The submission of this information shall in no way diminish the authority of the Employer's Agent to conduct such tests as he may consider necessary in order to determine the quality of the work performed by the Contractor, nor will he be bound to take account of the Contractor's tests, measurements, etc. should he consider these to be either incorrect or not representative.

Quality control and completion tests shall be in accordance with the relevant standard and amended specifications and additional specifications.

The tendered rates shall include the cost of all control testing, and no additional claims shall be entertained in this respect. This includes the supply of all necessary equipment required for these tests and/or inspections by the Employer's Agent.

Should the control testing performed or arranged by the Contractor not meet the requirements of the specification, the Employer's Agent shall have the right to conduct all such testing at the Contractor's expense.

In such a case, the Employer's Agent shall be given at least 72 hours' notice when testing is required. No claims, however, shall be considered in respect of delays resulting from such testing.

Whenever the Employer's Agent conducts control testing on behalf of the Contractor, charges shall be levied. The Employer's Agent may, from time to time, carry out his own check tests on the work performed by the Contractor. Should such check tests show the Contractor's control testing to be such that the quality of the Contractor's work can be called into question, then the Employer's Agent may order further check tests to be carried out on work already completed by the Contractor.

All costs associated with such check tests shall be for the Contractor's account as shall the costs of any other check test whose results do not comply with the specification.

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Where the Employer's Agent is required to witness certain control tests, such as the pressure testing of pipelines, and the results of such tests do not comply with the specifications, then charges will be levied against payments to the Contractor in order to recover the costs of the Employer's Agent's presence at the test.

The requirements of the Local Authority, insofar as their witnessing of tests, shall be adhered to.

PS 5.5.2 Inspection of Works by Local Authority

The Contractor shall afford inspectors from the Local Authority reasonable access to all parts of the site. The Employer's Agent in the presence of representatives of the Local Authority will generally undertake testing of the works. Accordingly the Contractor shall notify the Employer's Agent at least 24 hours in advance as to when the various sections of work will be available for testing. The Employer's Agent may require the Contractor to submit a weekly schedule of times, based on his programme, that he envisages work to be available for testing.

PS 5.5.3 Completion, Commissioning and Correction of Defects

The tendered rates shall include the cost of all activities and tests that may be required in ensuring proper completion and commissioning of the Works, and no additional claims shall be entertained in this respect. This includes the supply of all necessary equipment required for such and / or for inspections by the Employer's Agent and any other relevant authority.

Any defect in the Works shall be corrected to the satisfaction of the Employer's Agent.

PS 5.6 Recording of Weather and Abnormal Rainfall

If during the time for completion of the works or any extension thereof, abnormal rainfall or wet conditions shall occur, then an extension of time in accordance with Clause 5.12 in GCC 2015 hereof shall be granted by the Employer calculated in accordance with the formula given below for each calendar month or part thereof.

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

V	Extension of time in calendar days in respect of the calendar month under consideration.
Nw	Actual number of days during the calendar month on which a rainfall of Y mm or more has been recorded.
Nn	Average number of days, as derived from existing rainfall records, on which a rainfall of Y mm or more has been recorded for the calendar month.
Rw	Actual rainfall in mm recorded for the calendar month under consideration.
Rn	Average rainfall in mm for the calendar month as derived from existing rainfall records.

For purposes of the contract Nn, Rn, X and Y shall have those values assigned to them in the Contract Data and/or the Specification.

The total extension of time shall be the algebraic sum of all monthly totals for the period under consideration, but if the total is negative the time for completion shall not be reduced due to subnormal rainfall. Extensions of time for part of a month to be calculated using pro rata values of Nn and Rn.

This formula does not take account of flood damage that could cause further or concurrent delays and will be treated separately as far as extension of time is concerned.

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

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represent a fair allowance for variations from the average in the number of days during which the rainfall did not exceed Y mm but wet conditions prevented or disrupted work.

The following average rainfall figures are applicable:

INFORMATION SOURCE: South African Weather Service, Midrand, Tel.: 012 367 6014 Y

= 10 mm/24-hour day

X = 20 mm

STATISTICAL INFORMATION: MIDRAND: LATEST		
Month	RAINFALL	
	<u>Nn</u>	<u>Rn</u>
	<i>Actual number of days during the calendar months in which a rainfall of more than Y mm has been received</i>	<i>Average monthly rainfall</i>
January	2.4	140.7
February	1.3	69.4
March	0.9	45.4
April	0.2	32.6
May	0.3	15.9
June	0.0	6.0
July	0.0	0.8
August	0.0	3.2
September	0.1	5.4
October	1.3	48.9
November	1.2	63.7
December	1.9	107.1
TOTAL	9.5	539.1

The Contractor shall be permitted to take his own rainfall measurements on site subject to the Employer's Agent's approval, but access to the measuring gauge(s) shall be under the Employer's Agent's control. The Contractor is to provide and install all the necessary equipment for accurately measuring the rainfall as well as to provide, erect and maintain a security fence plus gate, padlock and keys at each measuring station, all at his own cost.

PS 5.7 Format of communications

All communication shall be in writing and any verbal agreements shall only be binding once confirmed and agreed to in writing. Communication by registered post, email or facsimile is acceptable.

The Contractor and the Employer shall follow the correct communication protocol applicable to a normal civil engineering contract. The Contractor shall not put into effect any instructions received by him, other than through such protocol.

Should the Contractor be unclear in this regard, he shall obtain a ruling from the Employer's Agent.

Contractor to provide the following reporting on a monthly basis, Local resources reporting shall include but not be limited to;

a) Number (labourers, SMMEs and suppliers),

Employer:		Contractor:	
Witness:		Witness:	



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- b) Labour:
- Process of recruitment, selection and appointment
 - Name and surname
 - Gender and age
 - Certified copies of ID not validated older than three months.
 - Proof of Compliance with COID Act, which will be valid for the duration of the Construction period.
 - Contact details (address, telephone numbers and ward number)
 - Contract signed
 - Duration of appointment
 - Commencement date
 - Termination date
 - Activity performed
 - Classification (Skilled, semi-skilled or unskilled (labourer))
 - Time or task rate
 - Allocated Supervisor/foreman
 - Health and Safety induction undergone
 - Training provided
 - i. Trainer details
 - ii. Type of training
 - iii. Duration of training
 - iv. Cost of training
 - v. Attendance register
 - Performance rating (good, fair, poor)
 - i. For training
 - ii. Work execution
 - iii. Health and safety awareness
 - Additional training or supervision to be provided
 - Proof of Monthly and cumulative payments, including salaries or wages
 - UIF Returns
 - Certified copy of the contractual agreement not validated older than three months.
- c) SMMEs
- Process of recruitment, selection and appointment
 - Company name
 - Company contact details (address, telephone numbers and ward number)
 - Company registration (also VAT and TAX)
 - Company age (months or years)
 - Type of company
 - Company size (number of permanent employees)
 - Name and surname of owner
 - Owner contact details (address and telephone numbers and ward number)
 - Gender, age and PDI status
 - Contract signed
 - Certified copies of ID
 - Proof of Compliance with COID Act, which will be valid for the duration of the Construction period.

Employer:		Contractor:	
Witness:		Witness:	



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- Duration of appointment
 - i. Commencement date
 - ii. Termination date
- Resources provided (labour and/or plant and/or materials)
- Activity performed
- Classification
- Time or task rate
- Allocated Contractor Supervisor/foreman
- Health and Safety induction undergone
- Training provided
 - i. Trainer details
 - ii. Type of training
 - iii. Duration of training
 - iv. Cost of training
 - v. Attendance register
- Performance rating (good, fair, poor)
 - i. For training
 - ii. Work execution
 - iii. Health and safety awareness
- Additional training or supervision to be provided
- Proof of Monthly and cumulative payments , including salaries or wages
- UIF returns
- Certified copy of the contractual agreement not validated older than three months

d) Suppliers

- Process of recruitment, selection and appointment
- Company name
- Company contact details (address, telephone numbers and ward number)
- Company registration (also VAT and TAX)
- Company age (months or years)
- Type of company
- Company size (number of permanent employees)
- Name and surname of owner
- Owner contact details (address and telephone numbers and ward number)
- Gender, age and PDI status
- Contract signed
- Duration of appointment
 - i. Commencement date
 - ii. Termination date
- Resources provided (plant and/or materials)
- Activity performed
- Allocated liaison
- Health and Safety induction undergone
- Performance rating (good, fair, poor)
- Monthly and cumulative payments

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Witness:		Witness:	



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The report format may be amended from time to time by the Engineer. However the initial format shall be finalised by the Employer's Agent in association with the Contractor.

PS 5.8 Key personnel

The Contractor is to provide the Curricula Vitae of key personnel to be employed on the project as well as the person's position and responsibilities within the project team. The Contractor shall provide the following minimum key staff:

- a) Contracts Manager
- b) Site Agent;
- c) Quality Manager/Auditor/Controller;
- d) Health and Safety Officer/s; and
- e) Foremen.
- f) SMME supervisor

PS 5.9 Management meetings

The Employer's Agent shall hold regular site meetings with representatives of the Contractor, and the Employer. Minutes of such site meetings shall be kept and distributed by the Employer's Agent. Senior Contractor management staff attendance shall be compulsory.

The Contractor shall be required to provide reporting with regard to project progress, resources (human, plant and equipment), community issues, environmental and health and safety aspects.

PS 5.10 Forms for contract administration

The Contractor shall maintain a file which shall contain project information related to project progress, resources (human, plant and equipment), community issues, environmental, health and safety aspects, penalties imposed, claims lodged and outcomes, disputes and resolutions, payment and variations.

PS 5.11 Daily records

In addition to records on rainfall and weather, labour, plant, and materials, a site diary, site instruction book (both in triplicate) and safety documents are to be provided and maintained by the Contractor on site and updated daily.

Such records shall be the property of the Employer and shall be made available to the Employer or his representative within 24 hours from being requested to do so.

These shall also be submitted to the Employer's Agent on completion of the contract.

PS 5.12 Bonds and guarantees

The Contractor shall within the period stated in the Contract Specific Data, of this document, provide the Employer with a Surety Bond in the form of a Bank Guarantee, Bank Transfer or a Guarantee from an approved Insurance Company to the satisfaction of the Employer in the form included in the Tender Documents. The Bank Guarantee shall be for an amount equal to ten per cent (10%) of the Tender Sum, for the due and punctual fulfilment and completion of all the Contractor's obligations under the Contract. No Extension of Time or any variation of the Contract nor the termination of the Contract by the Employer in terms of GCC 2015 hereof shall in any way impair or diminish or terminate any liability to the Employer under and by virtue of such Surety Bond. The cost of the Surety Bond to be so entered into, shall be at the expense in all respects of the Contractor; the Surety

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Bond to be released upon issue of the Employer's Agent's Certificate of Completion of the Works, unless otherwise stated in the Contract Data

Should the Contractor, when notified of the acceptance of his offer, fail to provide an approved Surety Bond within the stated period, then the Employer may, at his sole discretion:

- (a) Grant the Contractor a further reasonable period in which to provide the bond; or
- (b) Withdraw his acceptance of the tender, in which case the Contract shall be deemed to be void, but without prejudice to the Employer's rights to recover whatever damages he may have suffered by virtue of the Contractor's failure to fulfil his obligations.

PS 5.13 Payment certificates

Payment certificates shall be submitted to the Employer's Agent, in the format required, for approval and final submission to the Employer, on a monthly basis.

If any material on site is claimed, proof of ownership shall be provided, either by means of receipts, or by means of letters from the suppliers, stating that ownership has been transferred to the Contractor.

A VAT invoice shall be submitted to the Employer, by the Contractor, once each payment certificate has been finalised.

PS 6 FEATURES REQUIRING SPECIAL ATTENTION

PS 6.1 Security

The Contractor shall be responsible to provide his own security on site, as he deems necessary. The Employer shall not be held responsible for any loss or damage suffered by the Contractor, his plant, equipment, materials, Sub-Contractor or employees as a result of a security incident of any nature.

PS 6.2 Operation of Valves

Only employees of the Johannesburg Water SOC. are permitted to operate water valves.

Requests for isolation of any section of such reticulation shall be made to the relevant section of the local authority at least 4 working days in advance of the requirement for isolation. The Employer's Agent shall be advised of the requirement and will monitor the implementation of the request.

PS 6.3 Work outside normal working hours

The Contractor is permitted to work outside of normal working hours (07:00 to 17:00) only upon obtaining written permission from the Employer's Agent.

Should the Contractor choose to work outside normal working hours without having been ordered to do so by the Employer's Agent, permission will not be unreasonably denied but all additional costs arising out of such work shall be entirely to the Contractor's account.

PS 6.4 Sanitary facilities

The Contractor shall provide, maintain, move to positions required and finally remove, proper latrines in compliance with the relevant Municipal Sanitation General By-laws. Latrines must be properly screened and secluded from public view and their use shall be strictly enforced. The Contractor shall provide chemical toilets (or other approved toilets). Soak-a ways and septic tanks will not be allowed

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on the site. Temporary latrines must be sited so that they are within reasonable distance of the working place.

Sufficient latrines must be provided having regard to the number of persons employed on the Works. All latrines shall be adequately ventilated, properly disinfected and kept in a clean condition.

PS 6.5 Additional Meetings

The cost of all additional meetings or inspections over and above the normal that takes place because of the Contractor not keeping to his program or because of the quality of his work will be for the account of the Contractor and will be deducted from the following payment certificate. An amount of R 5 000.00 per meeting will be paid by the Contractor to compensate for the travelling cost, time, etc. of both the Employer's Agent and the Employer.

PS 6.6 Community liaison and community relations

For the purpose of this project a community liaison officers will be required; who shall be required to inform the community with regards to Contractor's activities in particular where such activities may affect the service provision to the affected community (See PS6.6).

In all dealings with the community and workers employed from within the community, the Contractor shall take due cognisance of the character, culture and circumstances of the community involved and shall at all times use his best endeavours to avoid the development of disputes and to foster a spirit of co-operation and harmony towards the project.

The Contractor shall at all times, keep the Employer's Agent fully informed on all matters affecting the community. The Contractor shall keep the community fully informed of progress and planned interruptions.

PS 6.7 Notices and warning to consumers

The Contractor shall ensure he maintains service (water and/or sanitation) provision at all times whilst executing the works where:

The maximum amount of time of no service shall be 8 hours for any property. Any service disruption longer than 8 hours shall be temporary bypassed by methodologies approved by the Employer's Agent or his duly authorized representative.

A Public Notification Program shall be implemented, requiring at minimum that the Contractor shall deliver written notices to each domestic and non-domestic customer affected by the works, 48 hours before commencement of the works, including providing:

- a summary of work to be completed;
- the time and duration of service interruption; and

a local telephone number to contact the Contractor for inquiries or complaints. All complaints received shall be addressed and resolved within the standard Employer response times and a summary of such complaints and associated actions shall be presented to the Employer's Agent or his duly authorized representatives on a monthly basis.

PS 6.8 Continuity of service supply to customers

The activities of the Contractor shall not unreasonably interfere with the service supply to customer and be executed outside the agreed and notice time frames.

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Where the Contractor cannot reasonably re-establish services within times agreed and notice time frames he shall proceed to contact the affected customer and make alternative arrangements that shall be acceptable to the customer and the Employer's Agent.

The associated costs of any customer claim arising from a lack of service provision due to the Contractor's negligence or his disregard for the Employer's SOP or his disregard for the conditions of this Contract, whilst executing activities as per this Contract, shall be solely for his the account. The Employer shall have the right to make equivalent monetary deductions from monies owed to the Contractor or from his Guarantee under this Contract and any other active contract(s) with the Employer.

PS 6.9 Conditions and procedures for service agencies

The Contractor shall comply with the conditions and procedures of the various affected service agencies, as mandated in their associated wayleaves.

PS 6.10 Reinstatement of asphalt by JRA

The JRA shall be given first preference to provide and execute all the reinstatement of asphalt at places where excavation is within the roadway. The Contractor shall make other adequate arrangements where the JRA:

indicated that it will not, for whatever reason, be able to perform such asphalt resurfacing; and

is the cause of delays, where in particular the Contractor shall note that the Employer shall not be liable for any additional extension of time related cost obligations to the Contractor, as he shall be deemed have agreed adequate conditions with the JRA and allowed for delays on the part of the JRA.

The minimum requirements of the Johannesburg Roads Agency is that the structural layers of the backfilled trench, i.e. the base, subbase, selected subgrade and subgrade down to a depth of 800 mm below the level of the surfacing of the road, must have at least the same shear strengths as those of the adjacent undisturbed structural layers.

It should be noted that it is generally very difficult to obtain the same quality structural layers in the confinement of a narrow trench as that of the undisturbed adjacent structural layers when the same materials are re-used.

The following method must therefore be used to ensure adequate shear strengths in trench backfill.

Use of a special concrete mix must be made for the final backfilling layer of 300mm.

All Road Trenches / Openings: Place 300 mm concrete manufactured according to the required specification. The mix is to be placed 100 mm below the level of the surrounding sound surface of the road. The remainder of the trench, above the bedding, shall be backfilled with selected approved material compacted to 90% of MOD AASHTO density.

All Footway Trenches / Openings: Place 150 mm concrete manufactured according to the required specification. The mix is to be placed 110 mm below the level of the surrounding sound surface. The remainder of the trench, above the bedding, shall be backfilled with selected approved material compacted to 90% of MOD AASHTO density.

The following properties are achieved with the specified concrete:

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- Excellent drainage.
- Non-shrink properties.
- High compressive strength due to point-to-point contact of coarse aggregate.
- Very low tensile strength due to the limited amount of cement, i.e., less than 0.5 MPa.
- Economical and easy to mix and place with wheelbarrows.
- It is recommended that the coarse aggregate that is used for no-fines concrete be single-sized.
- Please find herewith the table of no-fines concrete for areas around Johannesburg.
- Proportions by Dry Mass (kg/m^3) –

Class of concrete	No-fines N-East	No-fines N-West	No-fines N-North	No-fines N-South
32.5 Cem 2	120	120	120	120
19mm Aggregate single size	1430	1350	1350	1480
Water	52	52	52	52
Expected Strength at 7 days	2.0	2.0	2.0	2.0
Expected Strength at 28 days	3.1	3.1	3.1	3.1

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Notes:

No allowance has been made for wastage.

The materials are defined as follows:

- East - Reef Quartzite.
- North - Granite.
- South - Andesite.
- West - Granite.

PS 6.11 Generic labour-intensive specifications

EPWP guidelines shall not be applicable to this Contract, although it is expected that the Contractor execute the majority portion of the works utilising local labour. The Contractor will be required to submit monthly labour returns.

PS 6.12 Causes for rejection

Causes for rejection shall include, but not be limited to, not complying to the Employer's requirements and/or specifications and the intended purpose for this Contract, thus:

- poor data (including: photographs, recording, prints and reports) and data management;
- inaccurate surveys, with regard to linear meterage of manhole length;
- poor quality of survey information;
- silt, grease, and debris remaining in conduits after cleaning; and
- poor quality construction and remedial works:
- Cracks in any concrete works or pre-cast units shall be cause for rejection.
- honeycombed or patched areas in any concrete works or pre-cast units in excess of 0.02m² shall be cause for rejection.

PS 6.13 Protection against water and storms

The Contractor shall be responsible for the full adequate protection of the works against damage due to storms, rain, floods, stormwater, subsoil water and seepage from whatever source. The Contractor shall take over the site where the works has to be executed at the beginning of the Contract Period and the full risk and cost of dealing with all water shall be borne by the Contractor.

The Contractor shall also provide all necessary pipe work, pumps and other appliances necessary for adequate dewatering of all excavations and shall maintain these in good condition and provide adequate standby equipment to ensure that no disruption of work will ensue as a result of possible breakdown of equipment.

PS 6.14 Information supplied by the Employer's Agent

Certain information included in this document or supplied separately is presented in good faith and no guarantees can be given regarding the accuracy or representativeness thereof. This pertains more specifically to all soil tests, material results and similar information that are necessarily subject to limitations in the test methods and sampling. Natural variations in materials and formations also influence the applicability of certain conclusions.

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Witness:		Witness:	



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The Employer can therefore not accept any responsibility for the accuracy of any information or for any damage resulting from the fact that the information later proved wrong or not representative. If the Contractor chooses to rely on the information he does so at his own risk.

PS 6.15 Indemnity Certificate

The Contractor must, on completion of the Works, obtain certificates from all authorities concerned stating that they are satisfied with the condition of all borrow pits, detours, access roads and spoil material on their properties. The certificates must be handed over to the Employer's Agent before the maintenance period starts. The certificates will not exempt the Contractor from any obligations concerning the backfill of trenches, finishing off of borrow pits, access roads, detours etc. This work must still be carried out to the satisfaction of both the Employer and the Employer's Agent.

PS 6.16 Return of materials

All old valves, valve covers, meter boxes and all pipework that can be reused shall be returned by the Contractor to the Water Depot or as directed by the Employer's Agent. The Contractor shall obtain the signature of the Superintendent acknowledging receipt of materials returned. The Contractor shall determine the condition of the materials.

PS 6.17 Political and Community unrest

The Contractor shall notify the Client or its duly Authorized Representative/s of any unrest situation and shall indicate all active Contract sites affected.

PS 7 HEALTH AND SAFETY SPECIFICATION FOR CONSTRUCTION WORK

Contractors are to prepare Health and Safety Plans in accordance with Johannesburg Water's Health and Safety Specification (refer to Volume 4: Occupational Health and Safety Specification and Environmental Management Plan for Capital Investment Projects). The legal imperatives for this requirement stem from the Construction Regulations (2014), and more specifically the following:

Regulation 4(1)(a): An Employer shall prepare a documented health and safety specification for the construction work, and provide any principal Contractor who is making a bid or appointed to perform construction work for the Employer with the same

Regulation 4(1) (d): An Employer shall take reasonable steps to ensure that each principal contractor's health and safety plan is implemented and maintained on the construction site.

Regulation 4(2): An Employer shall discuss and negotiate with the principal Contractor the contents of the health and safety plan and thereafter finally approve the health and safety plan for implementation.

Regulation 5(1): A principal Contractor shall provide and demonstrate to the Employer a suitable and sufficiently documented health and safety plan, based on the Employer's documented health and safety specification

Employer:		Contractor:	
Witness:		Witness:	

**PS 7.1 Project-related Occupational Health and Safety Risks**

According to the Construction Regulations (2014), a Health and Safety Plan “means a documented plan which addresses hazards identified and includes safe work procedures to mitigate, reduce or control the hazards identified”. Apart from complying with the Health and Safety Specification (Volume 2), specific attention is drawn to the identification and assessment of risks. The tendering Contractors are required to consider inter alia the following risks (where applicable):

Project- and site-specific risks:

- Aggregate/Sand Delivery
- Arc welding
- Bench grinder
- Construction of manholes
- Compressed gas cylinders-handling
- Compressors – Air
- Cutting of pipes
- Distribution boards – Electrical
- Drivers – of vehicles
- Electrical installation – Maintenance of
- Excavator
- Gas explosions
- Fire prevention and protection
- Form and support work
- Front end loader
- Fuel supply
- Gas welding-cutting operations
- Hand and spray painting
- Hand tools
- Landscaping
- Laying of pipes
- Levelling – of materials
- Loading supervisor
- Loading/unloading - of trucks
- Machine operator
- Making of steel items
- Material delivery
- Material handling
- Mixer operator
- Pedestal drill
- Pedestal grinder
- Placing concrete

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Witness:		Witness:	



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- Portable ladders
- Refuelling vehicles/plant
- Scaffolding
- Site establishment
- Trenches – Digging of
- Trees – Bracing/removing if roots are
- Damaged during excavations
- Use of angle grinder
- Use of portable electrical tools
- Work in confined spaces
- Work in elevated positions
- Working close to existing services i.e. electrical, wastewater etc
- Working close to water
- Workshops.

Safe work and emergency procedures need to be prepared to address the abovementioned risks.

PS 7.2 Barricading of Trenches

The Contractor shall ascertain himself of the nature, volume, stability, depth and possible safety risks of the excavations, before any decision with regards to the method of excavation is made.

Allowance for hand excavation has been made for the location of services. Extreme caution shall be taken when excavating along the route of the new pipe for existing services. Any damages and or repairs to the existing services will be for the Contractor's account.

The length of open excavation must at all times not exceed 100m.

Adequately protected by a barrier or fence comprising fluorescent orange plastic netting of height at least 1 000 mm and as close to the excavation as practicable; and

Provided with notice boards marked "CLOSED " at each end of closed or partially closed roads.

The barrier or fence (at least 1m high) shall be suitably wrapped with reflective red and white danger tape or provided with flashing orange lights, placed at 15m intervals along the barricading at night.

Where the depth of an excavation or the nature of the material excavated renders the sides of the excavation liable to movement that might endanger the works or the workers engaged on the excavation,

the sides of the excavation shall be supported by suitable timber or other sheeting adequately strutted and braced, all properly assembled and of sufficient strength and stiffness to prevent movement in the materials supported, or, alternatively, the slope of the excavated face or faces shall be reduced so that any danger to the works or workers is removed.

Any cavities formed by the fall of rock or earth due to rain, flooding, insufficient timbering or other causes, shall be adequately filled.

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Witness:		Witness:	



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The Contractor shall so maintain borrow pits that they do not become a danger to persons or livestock.

NOTA BENE: Trenches may not be left open during the builder's holidays or for any shutdown period exceeding 5 calendar days. Should the Contractor not comply with this requirement without the written approval of the Employer's Agent; the Employer's Agent shall have the open trenches closed by others at the expense of the Contractor. Furthermore, all further opening-up of the backfilled excavation and dealing with the excavated material and subsequent making good will all be to the Contractor's cost.

PS 7.3 Precaution against Pollution and Contamination

The Contractor shall take all necessary steps and precautions to prevent pollution of the surrounding area by his employees in any way. Any debris falling from construction vehicles and plant shall be removed immediately.

Every care is to be taken to avoid possible contamination of the mains during construction. Pipes are not to be stacked in the streets or gutters. On completion of a section, all loose material and foreign bodies are to be removed. The open ends of the new pipeline are to be protected by watertight caps, to the satisfaction of the Employer's Agent, to prevent the entrance of groundwater and foreign bodies until such time as these sections are connected to the live mains.

Sterilising chemicals shall be supplied by the Contractor for sterilizing all new water mains. All new lines are to be thoroughly flushed. All sterilization shall be done at 10mg/l free chlorine for 12 hours. The Contractor shall give due notice to The Employer of his intention.

PS 7.4 Operations under Live Conditions

Prior to the execution of any operation under live conditions, the Contractor shall liaise with the Zandfontein JW Depot Operations Manager 011 531 9513 and Langlaagte JW Depot Operations Manager 011 477 4316/7, at least 14 working days in advance, in this regard. At least one representative of the Depot shall be present during the execution of such operation. These operations will include disconnection and reconnection to the existing Sewer/ water main and Water storage tank at the works.

PS 7.5 Guide to risk assessments

PS.7.5.1 Nine steps to Effective Risk Assessments

Step 1	Identifying the current as well as emerging hazard, risks or exposures.
Step 2	Aim to identify major hazards, don't waste time on the minor and detail except if such hazard has the potential to repeat itself on a frequent basis.
Step 3	Involve as many people as possible in the ongoing risk assessment process especially those at risk.
Step 4	Gather all the information and analyse it.
Step 5	Look at what actually could or has occurred including non-routine operations.
Step 6	Use a systematic approach to ensure all hazards are adequately addressed.
Step 7	Assess the risks identified or the risk has occurred by taking into account the effectiveness of current as well as controls under consideration.
Step 8	Ensure the process is practical, realistic, cost and business effective.
Step 9	Always record the assessment in writing including i.e. assumptions, date and why a particular decision has been made.

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Witness:		Witness:	



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PS.7.5.2 How serious is it?

Probability

- A Common
- B Has Happened
- C Could Happen
- D Not Likely
- E Practically impossible

Consequences

- 1 Fatality or permanent disability.
- 2 Major injury.
- 3 Average Lost Time Injury.
- 4 Minor Injury.
- 5 Medical Treatment or less.

		Probability				
		A	B	C	D	E
Consequence	1	1	2	3	4	5
	2	2	3	4	5	6
	3	3	4	5	6	7
	4	4	5	6	7	8
	5	5	6	7	8	9
Risk rating		Action				
1 - 3 =		Serious				
4 - 5 =		Immediate (within 1 week).				
6 - 7 =		High				
8 - 9 =		Within 1 month.				
		> 4 weeks.				
		Acceptable				
		No action but will consider from time to time.				

PS 8 ENVIRONMENTAL MANAGEMENT PLAN

Contractors are to adhere to the mitigation measures listed in the Environmental Management Plan (EMP) (refer to Volume 4: Occupational Health and Safety Specification and Environmental Management Plan for Capital Investment Projects). Environmental mitigation measures are actions needed to align a project implementation phase with environmental control principles, where potential impacts to the natural and social environment are prevented, minimised or remediated. Environmental safeguarding is governed by various sets of legislation, with the most noteworthy for this project constituting the National Environmental Management Act (No. 107 of 1998) and the National Water Act (No. 36 of 1998).

PS 9 HEALTH AND SAFETY AGENT AND ENVIRONMENTAL CONSULTANT

The contact details for the Health and Safety Agent and for the Environmental Consultant are:

Health and Safety Agent:

JW Health Safety Section

Environmental Consultant:

Contact Juliet Klaas for officer details

Employer:		Contractor:	
Witness:		Witness:	



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PS 10 GENERAL SECTION PAYMENT LIMITATION

The gross sum of items 8.3 and 8.4, as per SANS 1200A, may not exceed 15% of the total contract amount excluding contingencies and VAT. If the amount tendered for these items exceeds the above, the tender will be altered to the reduced amount by reducing these specific items.

Employer:		Contractor:	
Witness:		Witness:	



PS 11 EMPLOYMENT OF LABOUR

PS 11.1 INTERPRETATIONS

PS 11.1.1 Supporting documents

The Tendered Rules, Conditions of Contract, Standard, Supplementary and Specific Specifications and Construction Specifications and drawings shall inter alia be read in conjunction with this specification.

PS 11.2 Application

The provisions of this specification shall apply in respect of all workers and small, medium and micro enterprises other than the Contractor's key personnel, who are engaged on the execution of the works.

PS 11.3 Community Liaison Officer

The Project Steering Committee will identify a Community Liaison Officer (CLO) to facilitate liaison between the Contractor and the community and amongst other things to ensure that the employment of local labour proceeds smoothly.

All decisions regarding identification and hiring of labour, relieving labour of their duties, local problems and any other matter of local importance related to the Contract, will be made in consultation with the CLO.

PS 11.4 Appointment, Office and Replacement of CLO

The CLO will be appointed for the duration of the construction phase of this Contract.

The CLO will occupy his own office in the Contractor's camp from where he will fulfil his duties to identify, screen and nominate labour from the community in accordance with the Contractor's requirements.

The CLO will communicate with the Contractor daily regarding labour requirements.

Should it become apparent that the appointed CLO fails to meet his duties, he may be relieved from his duties and replaced by a new CLO in consultation and approval with the Employer's Agent.

PS 11.5 Duties of the CLO

- He will be available on site daily between the hours of 07:30 and 18:30, and at other times as the need arises.
- He will consult with the Contractor and the Employer's Agent daily to determine the labour requirements regarding number and skills, to identify possible labour disputes, and to inform local labourers timeously when they will be relieved.
- He will be responsible to screen candidates, to inform them of their conditions of temporary employment and to ensure their timeous availability.
- He will ensure that all workers who are involved in activities where productivity rates have been agreed, are fully informed regarding the expected level of productivity for the given tasks to be assigned as part of this Contract.
- He will attend disciplinary proceedings to ascertain that hearings are fair and reasonable.

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- In consultation with the Contractor, he will determine the needs of the local labour for relevant technical training. And will be responsible for the identification of suitable trainees. He will also be required to attend some of the training sessions.
- He will keep a daily written record of his interviews and community liaison.
- He will attend the monthly Contractual site meetings to report about the local community labour involvement as well as any other relevant issues that need attention.
- He will act as a liaison officer between the Contractors on site and the local community through the project committee.
- He will be involved in all SMME related matters (Contracts, terminations etc.)

PS 11.6 Scheduled Item

PS.11.6.1a Community Liaison Officers - Salaries Unit: Provisional Sum

The tendered sum shall include full compensation for the provisions of the CLO including salary (market related), provision of an office, transport costs, the cost of typing, printing and distributing notices, and for all other obligations to perform his job.

PS11.6.1b Community Liaison Officers – Cellular phone Unit: Provisional Sum

The Contractor must supply the CLO with a cellular phone for the duration of the CLO employment Contract and this rate must cover the cost of procuring and commissioning that phone.

PS11.6.1c Community Liaison Officers – Cellular phone calls Unit: Provisional Sum

.....

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PORTION 2: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS

PORTION 2.1: VARIATIONS TO THE STANDARDISED SPECIFICATIONS

SANS 1200A: CIVIL ENGINEERING CONSTRUCTION: PRELIMINARY AND GENERAL

This portion of the specification covers variations and additions to the SANS 1200 Standardised Specifications. The clause numbers hereunder consist of a prefix, such as "PSA" indicating an amendment to SANS 1200 A and a number that represents the number of the clause in SANS 1200.

PSA GENERAL

PSA 2 INTERPRETATIONS

PSA 2.3 DEFINITIONS

a) General

ADD THE FOLLOWING DEFINITIONS:

"General conditions: The General Conditions of Contract specified for use with this Contract and the special conditions of Contract as applicable.

Specified: As specified in the standardized specifications, the Drawings or the Project Specifications. Specifications shall have the corresponding meaning".

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 varies in accordance with the Time for Completion of the work, adjusted in accordance with the provisions of the Contract.

Value-related charge: A charge, the amount of which varies pro rata with 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 THE FOLLOWING:

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"All manufactured materials supplied shall be new materials unless the contrary is specified. All materials specified in accordance with SANS Specifications shall bear the SANS mark, whether so specified or not."

ADD THE FOLLOWING SUB-CLAUSE:

PSA 3.3 ORDERING OF MATERIALS

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 approximate quantities only. Before ordering materials of any kind the Contractor shall check with the Employer's Agent whether or not the scope of the work for which the materials are required is likely to change substantially. No liability or responsibility whatsoever shall be attached to the Employer for materials ordered by the Contractor except when ordered in accordance with written confirmation issued by the Employer's Agent."

PSA .4 PLANT

PSA 4.1 SILENCING OF PLANT

REPLACE THE CONTENTS OF SUBCLAUSE 4.1 WITH THE FOLLOWING:

"The Contractor's attention is drawn to the applicable regulations pertaining to noise and hearing conservation, framed under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) as amended.

The Contractor shall at all times and at his own cost, be responsible for implementing all necessary steps to ensure full compliance with such regulations, including but not restricted to the provision and use of suitable and effective silencing devices for pneumatic tools and other plant which would otherwise cause a noise level in excess of that specified in the said regulations.

Where appropriate, the Contractor shall further, by means of temporary barriers, effectively isolate the source of such noise in order to comply with the said regulations."

PSA 4.2 Contractor's offices, stores and services

Add the following to this sub-clause:

PSA4.2.1 Water, sanitation and electricity for construction purposes

a) Water

Water is available on the site from an existing network. A water supply point will be made available within approximately 200 meters from the area available for the erection of site offices and stores. The availability of water is subject to the Employer's conditions and requirements and the Contractor shall make the necessary arrangements with Johannesburg Water in advance.

The Contractor shall be responsible for negotiating all costs and necessary connections which might be required during the execution of the works. All connections will conform to the requirements of Johannesburg Water and costs applicable will be paid by the Contractor

b) Sewer

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The Contractor shall provide, maintain, move to positions as required and finally remove proper sanitary accommodation at each work front. Sanitary accommodation shall be properly screened and its use strictly enforced. The Contractor shall comply with the local authority's Sanitation General By-Laws Section 19(1) and 19(3).

The location of sanitary accommodation, prescribed in terms of the Sanitary General By-Laws, shall be approved by the Employer's Agent as being convenient for the person for whose use it is intended. The sanitary accommodation provided shall be adequately ventilated, properly disinfected and kept in a thoroughly clean condition at all times.

c) Power

Power is available on site. A power supply point will be made available within approximately 100 meters from the area available for the erection of site offices and stores. The availability of power is subject to Johannesburg Water's conditions and requirements and the Contractor shall make the necessary arrangements with Johannesburg Water or City Power in advance.

The responsibility lies with the Contractor to negotiate all costs and necessary connections which might be required during the execution of the works. All connections will conform to the requirements of Johannesburg Water and costs applicable will be paid by the Contractor.

Add the following to this sub-clause:

PSA4.2.2 Site works

An area will be made available by the JHB Water Works Manager for the Contractor's site offices, workshops and stores.

The Contractor shall make his own arrangements to secure the facilities provided.

No employees, apart from a security guard, may be housed on the site of the works.

Upon completion of the work in terms of this contract, the site shall be cleared of all structures, concrete slabs and waste and excavations shall be backfilled.

The Contractor shall make the necessary arrangements with Johannesburg Water to obtain access for the vehicles and personnel he intends to employ on site.

PSA4.2.3 Telephone Facilities

The Contractor will be responsible for arranging his own telephone facilities and will be responsible for all costs relating thereto.

PSA 4.3 Plant and Equipment

Add the following to this sub-clause:

The Contractor is required to provide all plant and materials necessary to carry out the works as required. No additional allowances other than those already specified in the Bill of Quantities shall be allowed for with respect to plant and materials.

Add the following to this sub-clause:

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The Contractor is required to provide all equipment necessary to carry out the works as required. No additional allowances other than those already specified in the Bill of Quantities shall be allowed for with respect to equipment.

Construction equipment shall be suited for the onsite intended use and shall comply with all relevant safety aspects required by the OHS Act.

PSA .5 CONSTRUCTION

PSA 5.1 SURVEY

PSA 5.1.1 Setting out of the works

Delete this sub-clause and replace with the following:

The Contractor shall set out the works and maintain their correct position, not only according to the Contract Documents but also according to any drawings or orders that he may receive from time to time from the Employer's Agent. The Contractor shall:

- a) be held responsible for the accuracy of the setting out for the full period of the Contract;
- b) use equipment and instruments that can ensure the necessary accuracy;
- c) be held responsible for the correction of any error at his own expense; and
- d) update the plans, which are kept on site so that all the changes approved by the Employer's Agent are reflected on the drawings. These drawings will represent record drawings and must consequently reflect the Works as they are actually built. The cost for this shall be deemed to have been included in all works construction rates. The Contractor must check drawings periodically and after completion of the Contract they shall be handed over to the Employer's Agent.
- e) confirm the levels and coordinates of all benchmarks prior to commencing with construction

PSA 5.1.2 Preservation and replacement of survey beacons and pegs subject to the Land Survey Act

DELETE THE WORDS "in the vicinity of boundaries" IN THE SECOND SENTENCE OF SUBCLAUSE 5.1.2 AND REPLACE THE WORDS "under the direction of" IN THE SAME SENTENCE WITH "in consultation and liaison with."

ADD THE FOLLOWING AFTER THE SECOND SENTENCE OF SUBCLAUSE 5.1.2:

"The Contractor and the Employer's Agent shall record on the said list, their concurrence or disagreement (as the case may be) regarding the completeness and accuracy of the details recorded therein."

REPLACE THE THIRD SENTENCE OF SUBCLAUSE 5.1.2 WITH THE FOLLOWING:

"At the completion of the Contract, the Contractor shall expose all pegs that were listed at the commencement of the construction as being in order and the Contractor shall arrange with a registered Land Surveyor for the checking of the positions of all such pegs and the replacement of those that the Land Surveyor's check reveals have become disturbed or damaged. The Contractor shall, as a precedent to the issue of the Certificate of Completion, provide to the Employer's Agent, a certificate from the registered Land Surveyor, certifying that all the pegs listed at the

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commencement of construction in accordance with the provisions of this clause, have been checked and that those found to have been disturbed, damaged or destroyed have been replaced in their correct positions, all in accordance with the provisions of the said Act.

The costs of all checking, replacement and certification as aforesaid shall be entirely for the Contractor's account. This, with the provisions always that the Contractor shall not be held liable for the cost of replacement of pegs which:

- (a) cannot reasonably be re-established in their original positions by reason of the finished dimensions of the permanent works, and
- (b) the contractor can prove beyond reasonable doubt to the satisfaction of the Employer's Agent, were disturbed, damaged or destroyed by others beyond his control."

Add the following to this sub-clause:

PSA 5.1.3 Alterations, additions, extensions and modifications to existing works

The Contractor is required to verify the accuracy of all drawings and levels provided by the Employer's Agent prior to commencing with any construction activities.

Where the Works require that alterations, additions, extensions and / or modifications be carried out to existing works or facilities, these shall be carried out strictly in accordance with the requirements of the relevant authorities.

PSA 5.2 WATCHING, BARRICADING, LIGHTING AND TRAFFIC CROSSINGS

Replace the words "traffic crossings" in the heading and in text of this sub-clause with the words "accommodation of traffic"

Add the following:

PSA 5.2.1 General Accommodation of Traffic

The Contractor shall be responsible for the safe and easy passage of vehicular and pedestrian traffic over, past or alongside the works.

PSA 5.2.2 Traffic control

Wherever the contractor's activities on site affect or have the potential to affect the normal flow or safety of traffic during the construction, he shall be responsible for all aspects of traffic control, including flagmen, warning devices, signs, channelisation devices, layout of detours and by-passes, sign sequences and layouts, and all the requirements of the Chief Traffic Officer of the Local Authority.

Only warning devices, signs and channelisation devices included in the latest Road Traffic Ordinance of the province concerned (hereinafter referred to in this clause as the "Ordinance") shall be used. The standard patterns of the traffic control devices and signs, and the traffic -control procedures and methods prescribed in the Ordinance shall be applied. The dimensions and other properties of all signs and devices and the sign and device sequences, layouts and spacing shall be in accordance with the provisions of the Ordinance unless otherwise specified. In addition, signs and devices shall be placed at the positions shown on the Drawings. In cases not covered by the Ordinance, the signs, speed limits, devices, sequences, layouts and spacing shall comply with the requirements of The

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South African Road Traffic Signs Manual, the Chief Traffic Officer of the relevant authority, and the Employer's Agent.

The Contractor shall ensure the safe accommodation of traffic at all areas where the Works may impact on traffic, and shall provide all drums, watching, lighting, signs and barricades required by the road authorities, and in accordance with the South African Road Traffic Signs Manual. In this regard, the following references have been extracted from the SARTSM Volume 2, Chapter 13:

Item

Page No.

General

13.10.1

Urban Roadworks

13.10.1

Temporary Traffic Signals

13.10.2

Sidewalk Deviation

13.10.4

Localised Work Site – Good Visibility

13.10.6

Lane Closed Beyond a Junction

13.10.8

Work within a Junction

13.10.10

Work in a One-way Street

13.10.12

Road Closure - CBD

13.10.14

Road Closure – Dual Carriageway Street

13.10.16

Road Closure - Detour

13.10.18

Freeway/Dual Carriageway: Lane Closure

13.11.3

Where applicable, the Contractor shall be responsible for traffic-control at night and adequate warning lights and flashing lights shall be provided.

PSA 5.3 PROTECTION OF STRUCTURES

Add the following:

PSA 5.3.1 Inspection of adjoining properties

The Contractor shall carry out inspections and evidence collection, as he deems appropriate, of properties adjoining the works to ensure that, in the event of a claim arising from any of the owners of the adjoining properties for damage to property and the like, the Contractor has substantial evidence to support or refute such claims. The Contractor accepts full liability and responsibility for damage that he causes to adjoining properties as well as any costs involved in refuting or processing of such claims.

Add the following:

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PSA 5.3.2 Protection of Trees

Where so directed by the Employer's Agent, adequate measures shall include double wrapping of sacking or similar material, around the bole up to 1,5m height. Compensation for the cost of such measures will be made under the relevant items in the Bill of Quantities.

PSA 5.4 LOCATION AND PROTECTION OF EXISTING SERVICES

PSA 5.4.1 Location of existing services

Before commencing with any work in an area, the Contractor shall ascertain the presence and actual position of all services which can reasonably be expected by an experienced and competent Contractor to be present on, under, over or within the Site.

Without in any way limiting his liability in terms of the Conditions of Contract in relation to damage to property and interference with services, the Contractor shall, in collaboration with the Employer's Agent, obtain the most up-to-date plans as are available, showing the positions of services existing in the area where he intends to work. Neither the Employer nor the Employer's Agent offers any warranty as to the accuracy or completeness of such plans and because services can often not be reliably located from plans, the Contractor shall ascertain the actual location of services depicted on such plans by means of careful inspection of the Site.

Thereafter, the Contractor shall, by the use of appropriate methodologies, carefully expose the services at such positions as are agreed to by the Employer's Agent, for the purposes of verifying the exact location and position of the services. Where the exposure of existing services involves excavation to expose underground services, the further requirements of sub Clauses 4.4 of GCC 2015 and 5.1.2.2 of SANS 1200 D (as amended) shall apply.

The aforesaid procedure shall also be followed in respect of services not shown on the plans but which may reasonably be anticipated by an experienced Contractor to be present or potentially present on the site.

All services, the positions of which have been determined as aforesaid at the critical points, shall henceforth be designated as 'known services' and their positions shall be indicated by the Contractor on a separate set of drawings, a copy of which shall be furnished to the Employer's Agent without delay.

As soon as any service which has not been identified and located as described above is encountered on, under, over or within the site, it shall henceforth be deemed to be a known service and the aforesaid provisions pertaining to locating, verifying and recording its position on the balance of the site shall apply. The Contractor shall notify the Employer's Agent immediately when any such service is encountered or discovered on the Site.

Whilst he is in possession of the Site, the Contractor shall be liable for all loss of or damage as may occur to known services, anywhere along the entire lengths of their routes, as may reasonably be deduced from the actual locations at which their positions were verified as aforesaid, due cognizance being taken of such deviations in line and level which may reasonably be anticipated, and any other service which ought reasonably to have been a known service in accordance with the provisions of this clause.

The Contractor shall also be liable for consequential damage in regard to (a) and (b), whether caused directly by the Contractor's operations or by the lack of proper protection.

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No separate payment will be made to the Contractor in respect of any costs incurred in preparing and submitting to the Employer's Agent the Drawings as aforesaid. These costs shall be deemed included in the Contractor's other tendered rates and prices included in the Contract.

Payment to the Contractor in respect of exposing services at the positions agreed by the Employer's Agent and as described above will be made under the payment items (if any) as may be provided for in the respective sections of the specifications pertaining to the type of work involved.

PSA 5.4.2 Protection during construction

The Contractor shall take all reasonable precautions and arrange its operations in such a manner as to prevent damage occurring to all known services during the period which the Contractor has occupation and/or possession of the Site.

Services left exposed shall be suitably protected from damage and in such a manner as will eliminate any danger arising there from to the public and/or workmen, all in accordance with the requirements of the prevailing legislation and related regulations.

Unless otherwise instructed by the Employer's Agent, no services shall be left exposed after its exact position has been determined and all excavations carried out for the purpose of exposing underground services shall be promptly backfilled and compacted. In roadways, the requirements of Subclause 5.9 of SANS 1200 DB should be observed. In other areas compaction is to be to 90% modified AASHTO density.

PSA 5.4.3 Alterations and repairs to existing services

Unless the contrary is clearly specified in the Contract or ordered by the Employer's Agent, the Contractor shall not carry out alterations to existing services. When any such alterations become necessary, the Contractor shall promptly inform the Employer's Agent, who will either make arrangements for such work to be executed by the owner of the service, or instruct the Contractor to make such arrangements himself.

Should damage occur to any existing services, the Contractor shall immediately inform the Employer's Agent, or when this is not possible, the relevant authority, and obtain instructions as to who should carry out repairs. In urgent cases, the Contractor shall take appropriate steps to minimize damage to and interruption of the service. No repairs of telecommunication cables or electric power lines and cables shall be attempted by the Contractor.

The following list of contact telephone numbers is provided for:

Service	Authority	Contact Details	Contact Number	Email Address
Communication	Telkom	Samuel Seleke	011 309 9113	gautengwayleaves@telkom.co.za
	MTN	Khumo Maponya	083 212 5178	wayleaves@mtn.co.za
	Neotel	Shane Cannon	072 628 6127	shane.cannon@neotel.co.za
	Dark Fibre Africa	Wilson Gqada	082 871 4895	wilson.gqada@noc.dfafrica.co.za

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Service	Authority	Contact Details	Contact Number	Email Address
	Citi Connect	Bongani Mahlangu	087 490 0358	Bongani@citiconnect.co.za
Electricity	Eskom	MG Phala	011 711 2177	PhalaMG@eskom.co.za
Municipal Electricity	City Power	Phumudzo Netshisaulu	011 443 8800	pnetshisaulu@citypower.co.za
Gas	Sasol	R Mmphofu	011 865 8774	wayleaves@sasol.com
	Egoli Gas	Cassandra Selo	011 356 5038	cassandra@egoligas.co.za
Bulk Water	Rand Water	Wayleaves	011 682 0962	wayleave@randwater.co.za
Provincial Road	Gautrans	J Olivier	012 310-2200	
Municipal Road	Johannesburg Roads Agency	Ron Neeleman	011 298 5019	servicesinfo@jra.org.za
Municipal Water	Johannesburg Water	Wayleave Department	011 688 1610	

PSA .6 TOLERANCES

ADD THE FOLLOWING SUBCLAUSE TO CLAUSE 6:

PSA 6.4 USE OF TOLERANCES

No guarantee is given that the full specified tolerances will be available independently of each other, and the Contractor is cautioned that the liberal or full use of any one or more of the tolerances may deprive him of the full or any use of tolerances relating to other aspects of the work.

Except where the contrary is specified, or when clearly not applicable, all quantities for measurement and payment shall be determined from the 'authorised' dimensions. These are specified dimensions or those shown on the drawings or, if changed, as finally prescribed by the Employer's Agent, without any allowance for the specified tolerances. Except if otherwise specified all measurements for determining quantities for payment will be based on the 'authorised' dimensions.

If work is constructed in accordance with the 'authorised' dimensions plus or minus the tolerances allowed, the calculation of quantities will be based on the 'authorised' dimensions, regardless of the actual dimensions to which the work has been constructed.

When the work is not constructed in accordance with the 'authorised' dimensions plus or minus the tolerances allowed, the Employer's Agent may nevertheless, at his sole discretion, accept the work for payment. In such cases no payment shall be made for quantities of work or material in excess of

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those calculated for the 'authorised' dimensions, and where the actual dimensions are less than the 'authorised' dimensions minus the tolerance allowed, quantities for payment shall be calculated based on the actual dimensions as constructed".

PSA .7 TESTING

PSA 7.2 APPROVED LABORATORIES

REPLACE THE CONTENTS OF SUBCLAUSE 7.2 WITH THE FOLLOWING:

"Unless otherwise specified in the relevant specification or elsewhere in the Project Specification, the following shall be deemed to be approved laboratories in which design work, or testing required in terms of a specification for the purposes of acceptance by the Employer's Agent of the quality of materials used and/or workmanship achieved, may be carried out:

- (a) Any testing laboratory certified by the South African National Accreditation Systems (SANAS) in respect of the nature and type of testing to be undertaken for the purposes of the Contract;
- (b) Any testing laboratory owned, managed or operated by the Employer or the Employer's Agent;
- (c) Any testing laboratory established and operated on the Site by or on behalf of the Employer or the Employer's Agent;
- (d) Any other laboratory that the Employer's Agent approves in his absolute discretion".

PSA .8 MEASUREMENT AND PAYMENT

PSA 8.1 MEASUREMENT

PSA 8.1.2 Preliminary and General Item or Section

PSA 8.1.2.1 Contents

REPLACE THE LAST SENTENCE OF SUBCLAUSE 8.1.2.1(b) WITH THE FOLLOWING:

"Separate items will be scheduled to cover the fixed, value-related and time-related components of the Contractor's preliminary and general costs".

PSA 8.2 PAYMENT

PSA 8.2.1 Fixed-charge and Value-related Items

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.1 WITH THE FOLLOWING:

PSA 8.2.1.1 Fixed-charge Items

Payment of fixed charges in respect of item 8.3.1 will be made as follows:

- (a) EIGHTY PER CENT (80%) of the sum tendered will be paid when the facilities have been provided and approved;
- (b) The remaining TWENTY PER CENT (20%) will be paid when the works have been completed, the facilities have been removed and the site of the

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Contractor's establishment has been cleared and cleaned to the satisfaction of the Employer's Agent.

No adjustment will be made to the sum tendered in respect of item 8.3.1 should the value of the works finally executed or the time for completion vary in any way from that specified in the tender".

PSA 8.2.1.2 Value-related Items

Payment for the sum tendered under item 8.3.2 will be made in three separate instalments as follows:

- (a) The first instalment, which is 40% of the sum, will be paid when the Contractor has fulfilled all his obligations to date under this specification, the General Conditions of Contract and the Special Conditions of Contract, and when the value of work certified for payment, excluding materials on site and payments for preliminary and general items, is equal to not less than 5% of the total value of the work listed in the Schedule of Quantities.
- (b) The second instalment, which is 40% of the sum, will be made when the amount certified for payment, including retention moneys but excluding this second instalment, exceeds 50% of the tender sum.
- (c) The final payment, which is 20% of the sum, will be made when the works have been certified as completed and the Contractor has fulfilled all his obligations to date under this Specification, the General Conditions of Contract and the Special Conditions of Contract.

Should the value of the measured work finally completed be more or less than the tender sum, the sum tendered under item 8.3.2 will be adjusted up or down in accordance with the provisions of Clause 6.11 of the Conditions of Contract 2015, and this adjustment will be applied to the third instalment".

PSA 8.2.2 Time-related Items

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.2 WITH THE FOLLOWING:

"Subject to the provisions of sub clauses 8.2.3 and 8.2.4, payment under item 8.4.1 (time-related item) will be made monthly in equal amounts, calculated by dividing the sum tendered for the item by the tendered contract period in months, provided always that the total of the monthly amounts so paid for the item is not out of proportion to the value of the progress of the Works as a whole".

PSA 8.3 SCHEDULED FIXED-CHARGE AND VALUE-RELATED CHARGE

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 8.3

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PSA 8.3.2.1 Facilities for engineer..... Unit :
Sum

The facilities will be as described in PSAB 3.2.

PSA 8.3.2.1 Telephone Unit :
Sum

The facilities will be as described in PSAB 4.1.

PSA 8.3.2.1 Computer Facilities Unit :
Sum

The facilities will be as described in PSAB 4.3.

PSA 8.3.2.1 Nameboard..... Unit :
Sum

The facilities will be as described in PSAB 3.1.

PSA 8.3.2.1 Carport..... Unit :
Sum

The facilities will be as described in PSAB 3.3.

PSA 8.3.5 Additional Contractual Obligations

PSA 8.3.5.1 Notice and warning to consumers..... Unit :
Sum

The sum shall cover the full compensation and cost of supply and delivery of the notices and warnings to customers at least 3 days before a shutdown is to take place in each section of work.

PSA 8.3.5.2 OHS Act Obligations..... Unit:
Sum

The sum shall cover the full compensation and fixed costs for the compliance with the Occupational Health and Safety Act, Construction Regulations 2003 and all the requirements stipulated in the Employer's Health and Safety Specifications".

PSA 8.3.5.3 EMP Obligations Unit:
Sum

The sum shall cover the full compensation and all fixed costs for compliance with the requirements of The Employer's Environmental Management Plan.

PSA 8.4 SCHEDULED TIME-RELATED ITEMS

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 8.4.

Employer:		Contractor:	
Witness:		Witness:	



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PSA 8.4.2.1 Facilities for engineer Unit :
Sum

The facilities will be as described in PSAB 3.2.

PSA 8.4.2.1 Telephone Unit :
Sum

The facilities will be as described in PSAB 4.1.

PSA 8.4.2.1 Computer Facilities..... Unit
: Sum

The facilities will be as described in PSAB 4.3.

PSA 8.4.2.1 Nameboard Unit :
Sum

The facilities will be as described in PSAB 3.1.

PSA 8.4.2.1 Carport..... Unit :
Sum

The facilities will be as described in PSAB 3.3.

PSA 8.4.6 Additional Obligations

PSA 8.4.6.1 OHS Act Obligation... Unit:
Sum

The sum shall cover the full compensation and all time related costs for the duration of the contract, for the compliance with the Occupational Health and Safety Act, Construction Regulations 2003 and all the requirements stipulated in the Employer's Health and Safety Specifications. The cost shall include the salary for a full time OHS Officer for the project.

PSA 8.4.6.2 Compliance with Environmental Management Plan Unit:
Sum

The sum shall cover the full compensation and all time related costs for the duration of the contract, for the compliance with the Environmental Regulations and all the requirements stipulated in the Employer's Environmental Management Specifications.

PSA 8.4.6.3 Security services costs..... Unit:
Month

The sum shall cover the full compensation and all costs for a sufficient 24 hour guarded services for the duration of the contract.

Employer:		Contractor:	
Witness:		Witness:	



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PSA 8.4.6.4 Community Liaison Officer Unit: Stated
Sum

The stated sum shall cover full compensation and all costs payable on a monthly basis, to provide a full time qualified and suitable experienced Community Liaison Office for the duration of the contract. The stated sum shall also cover for the CLO cell phone airtime.

PSA 8.5 SUMS STATED PROVISIONALLY BY EMPLOYER'S AGENT

AMEND SUBCLAUSE 8.5.b)1 AND ADD THE FOLLOWING ITEMS:

- i) Alteration to existing services by authorities Unit: Stated
Sum
- ii) Control tests by independent laboratory Unit: Stated
Sum
- iii) Provision of photographic records Unit: Stated
Sum
- iv) CLO and CSO... Unit: Stated
Sum
- v) Temporary protection of services... Unit: Stated
Sum
- vi) Pipeline Cathodic Protection... Unit: Stated
Sum
- vii) Reinstatement of asphalt by JRA..... Unit: Stated
Sum
- viii) Supply or hire of specialist equipment.....Unit: Stated
Sum
- ix) Training of Labour.....Unit: Stated
Sum
- x) Provision of time-lapse photography and equipment for duration of the project
and post processing.....Unit: Stated
Sum
- xi) Electrical Connection to Site by Client Unit: Stated
Sum
- xii) Water Connection to site Unit: Stated
Sum
- xiii) Sewer Connections to site by Client... Unit: Stated
Sum
- xiv) Topographical Survey and Bench marking at the commencement of the
project. Unit: Stated
- xv) Demolition of existing works and
disposing..... Unit: Stated
- xvi) Third Party Test of concrete cubes..... Unit: Stated
- xvii) Solar system for backup power supply Unit: Stated
- xviii) Provision of High Mast Lighting Unit: Stated

Employer:		Contractor:	
Witness:		Witness:	



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The Contractor is responsible for both the cost of normal testing as described in the Project Specifications and for the cost of any additional test that indicates that the Specifications have not been complied with".

These sums will be paid to the Contractor in equal monthly amounts".

PSA 8.7 DAYWORKS

ADD THE FOLLOWING NEW CLAUSES:

PSA 8.7.1 Scope

This section covers the method of measurement and payment for work carried out on a day work basis.

PSA 8.7.1.1 General Requirements

Work will be classified as day work only if the Employer's Agent considers no other rate in the Bill of Quantities appropriate for payment purposes.

An instruction regarding all work to be carried out under day work in terms of Clause 6.5 of the General Conditions of Contract 2015 will be issued at the discretion of the Employer's Agent. Some or all of the items priced under day work in the Bill of Quantities may possibly not be required for this Contract.

Before ordering any material, the Contractor shall submit quotations to the Employer's Agent for his approval and shall submit such receipts or vouchers to the Employer's Agent as may be necessary for proving the amount claimed.

PSA 8.7.1.2 Measurement and Payment - Day works

The day work rates submitted for vehicles and construction equipment, in the Bill of Quantities shall be a hire charge for the use of the vehicle and driver or constructional plant/equipment and operator (excluding VAT) and shall apply only to vehicles and construction equipment approved in writing by the Employer's Agent. The rate shall include for maintenance, fuels and oils and other operating costs, establishment, insurance and other contingency costs relating to the running of the vehicle, plant or equipment.

Where there is ambiguity between the power developed at the flywheel and mass of a machine, the power shall govern the measurement category.

The Contractor and the Employer's Agent will agree on the method of recording the working hours prior to the commencement of the work. Any long period of idling at any one time which in the opinion of the Employer's Agent or his representative is beyond that required for normal operating conditions will not be paid for as working time. Non-working hours for any reason shall not be measured for payment.

The ten percent allowed for overheads etc. as per Clause 6.5.1.2.3 of the General Conditions of Contract 2015 shall include full compensation for all administrative costs, supervision, overheads, liabilities and obligations related to the running of the vehicles, constructional plant and equipment. The tendered percentage shall also include for profit and shall be subject to the Contract Price Adjustment factor laid down in the Contract Data.

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PSA 8.8 TEMPORARY WORKS

PSA 8.8.2 AMEND THE SUB CLAUSE AS FOLLOWS

Dealing with Traffic or accommodation of traffic and access to properties

Unit: Sum

PSA 8.8.4 Existing Services

AMEND THE SUB CLAUSE AS FOLLOWS:

PSA8.8.4 a) Supply or hire of specialist equipment..... Unit: Sum

The sum shall cover the cost for the supply, operation and/or hire of specialist equipment for detection of underground services as ordered by the Employer's Agent.

PSA 8.8.4 b) Excavate by hand in soft material to expose existing services... .. Unit: m³

The rate shall cover the cost for removal of premix or other surfacing where necessary, excavating in all materials, shoring, backfilling, compaction and reinstatement of surfaces except for asphalt.

PSA 8.8.6 Special Water Control Unit: Sum

The tendered rate shall include all cost to ensure that no water enter or stand in excavated trenches, low laying areas or portions of the site under construction.

The tendered rate shall also include all cost to ensure that ingress of sub-surface water is controlled and pumped out of the excavated areas. All plant, labour and operation costs as well as equipment required to secure a dry working area and pumping of water shall be included in the tendered rate.

PSA 8.8.7 Dealing with other Service Authorities, obtaining of wayleaves, etc..... Unit: Sum

The contractor will be responsible to:

- Submit applications for all wayleaves into his name;
- Maintain wayleaves throughout the duration of the contract and
- Comply with conditions.

The tender rate shall include all costs for dealing with the following service authorities and for fulfilment of way leave requirements:

- Johannesburg Water.
- City Power.
- City Parks.
- Eskom.
- Telkom.
- Rand Water.
- Egoli Gas.
- Sasol.
- Neotel.

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Witness:		Witness:	



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- Dark Fibre Africa.
- MTN.
- Citi Connect.
- Johannesburg Roads Agency.
- Others which may be identified.

PSA 8.8.8 Working in close proximity to another contractor on a confined site..... Unit: weeks

The unit of measurements shall be weeks. The inlet pipeline to the reservoir will enter the site from Woodmead Drive, run along the Pikitup wall, include a chamber and then exit the site at Jessica Close. The planned infrastructure for the inlet pipeline is shown on the relevant drawings. The inlet pipeline does not form part of this Contract and will be carried out by another contractor. These two contracts may run concurrently for an estimated maximum of 16 weeks. The rate must include all costs associated with working alongside another contractor on the confined site.

PSA 8.8.9 Relocation of unauthorised individuals..... Unit: sum

The unit of measurement shall be sum. This item shall include all costs associated with the physical relocation of the individuals currently living on the reservoir site. Johannesburg Water shall be responsible for all negotiations with the relocation and shall also agree with the individuals on the destination. The rate shall include making a list of all belongings of all individuals and having the list signed off. The list shall again be signed off by the individuals once all their belongings have been relocated. Individuals shall be compensated by the Contractor if any items are damaged during the relocation.

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Witness:		Witness:	



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PSAB EMPLOYER'S AGENT'S OFFICE

PSAB 3 MATERIALS

PSAB 3.1 NAMEBOARDS

DELETE THE ENTIRE CLAUSE AND REPLACE WITH:

"The name board shall be of either tempered hardboard at least 12mm thick or steel sheeting so braced on the reverse side as to prevent warping or buckling and shall be mounted on two or more firmly planted poles as necessary. The quality of the paint shall conform to SANS Standard Specification CKS 193. The colour of the paint shall conform to SANS 1091-1975 colour F11, strong blue. The Employer's SOC Ltd logo shall be in colour. The height of the larger name board shall be 2400mm and the width 4800mm, whilst the height of the smaller name board shall be 800mm and the width 1600mm".

PSAB 3.2 OFFICE BUILDING(S)

Delete this sub-clause entirely and re-title the sub-clause "FACILITIES FOR THE EMPLOYER'S AGENT"

Add the following sub-clause.

PSAB 3.2.1 Office Building(s)

The Contractor shall provide, furnish and equip one or more offices (as scheduled) for the use of the Employer's Agent.

The Contractor shall provide, furnish and equip one or more offices (as scheduled) for the use of the Employer's Agent.

The Contractor shall provide and furnish one office for the use of the Employer's Agent. Each office shall consist of one room with a floor area of at least 15 m² and a ceiling height of at least 2.5 m.

Each office shall be weatherproof, shall be air conditioned, shall have a wooden boarded floor that is at least 150 mm above the ground, and shall be provided with a ceiling and a lining to the walls, or equivalent insulation, with an acceptable type of door with a secure lock, and two opening windows of glazed area at least 3 m². Each office shall be well ventilated and shall be so insulated as to provide comfortable working conditions.

Office building shall be painted with an approved paint after erection and the paintwork shall be maintained during the contract period.

Each door shall be provided with a lock and two keys.

The sitting of all offices shall be to the Employer's Agent's satisfaction and shall be decided upon in consultation with him/her and confirmed in writing before erection.

All accommodation shall include the provision of access roads where required, fresh clean portable water and sewerage, which will be considered as part and parcel of the accommodation provided and will not be paid for separately.

The site Office shall be fenced using diamond wire mesh right round with access gate.

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All accommodation shall meet with the approval of the Employer's Agent.

The offices shall comply with the following requirements.

Dimensions	Boardroom	Employer's Agent's Office
Minimum floor area	28 m ²	15 m ²
Minimum window area	4.0 m ²	3.0 m ²
Minimum window area opening	2.4 m ²	1.5 m ²
Minimum clear height	2.5 m	2.5 m
Shaded parking for vehicles	2	2

Furniture and Equipment

Employer's Agent's shall be equipped with the following:

- Office desk with a surface area of at least 1.5m² with at least 3 drawers one of which can be locked.
- Two office chairs.
- a lockable upright steel cabinet with three shelves or a steel filing cabinet with four drawers.
- Refrigerator.
- Printer and other computer equipment as per PSAB4.3.
- Sufficient racks and hangers for hanging contract drawings. The hangers shall have one hanger to five drawings.
- 1 x Double 80-watt fluorescent light fittings complete with ballast and tubes.

The Boardroom shall be equipped with the following:

- i. Conference table large enough to accommodate twelve people and have an area of at least 15m².
- ii. Fifteen office chairs.
- iii. 2 x Double 80-watt fluorescent light fittings complete with ballast and tubes.

The Contractor shall also supply a toilet for the exclusive use of the Employer's Agent.

The Contractor must provide basic survey instruments: dumpy level, tripod stand and staff.

On completion of the Works, ownership of the buildings, furnishings and equipment shall revert to the Contractor who shall remove them from the Site.

PSAB 3.3 CARPORT

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall construct the number of carports specified in Portion A of the Project Specifications, for the sole use of the Employer's Agent and his staff. Each carport shall be constructed so that the vehicle parked under it is always protected against the direct rays of the sun.

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The carport area shall be at least 20 m² and the floor shall be covered with a layer of crushed stone to alleviate dusty and muddy conditions. The carport(s) shall be positioned so as to provide easy and convenient access to the Employer's Agent's office."

PSAB 4 PLANT

PSAB 4.1 TELEPHONE

REPLACE SUBCLAUSE 4.1 OF SANS 1200 AB WITH THE FOLLOWING:

"The Contractor shall at his own cost, arrange for the provision of a smartphone, airtime and data bundles for the duration of the contract for the Employer's Agent's representative. The Contractor at the tendered rates under the relevant scheduled item shall recover the associated charges and telephone calls and data bundles associates with the contract.

PSAB 4.2 SURVEY EQUIPMENT

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall provide on-site and make available for the exclusive use of the Employer's Agent and his staff, the survey equipment listed in Portion A of the Project Specifications.

All survey equipment provided by the Contractor shall be in good condition, properly calibrated and fit for the purpose.

In addition to survey equipment provided by the Contractor for the exclusive use of the Employer's Agent and his staff, the Contractor shall make available for use by the Employer's Agent, the further survey equipment listed in Portion 1 of the Project Specifications, at all times when such is reasonably required by the Employer's Agent and his staff for the purposes of the Contract".

PSAB 4.3 COMPUTER FACILITIES

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall, for the duration of the Contract, provide, insure, protect, secure and maintain computer facilities including the following:

- a laptop with a processor similar or equal to an Intel ® i3 processor, at least 4 GB Ram, a hard disk drive of at least 100 GB;
- an external hard disk drive of similar or larger capacity as the internal hard disk drive of the laptop for backups;
- an additional mouse, keyboard and screen;
- an A3 Colour printer with sufficient ink / toner, capable to scan, print, copy and fax;
- Wireless data modem;
- Data plan for at least 5GB data per month;

All the equipment mentioned above will be handed back to the Contractor at the conclusion of the project.

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Witness:		Witness:	



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The following software shall be properly installed on the computer, and the original license agreements and disks shall be provided to the Employer's Agent for safekeeping:

- Microsoft Windows 7 or newer.
- MS-Office 2013.
- MS Projects 2013.
- .pdf viewer.

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

The Contractor shall further provide at his own cost, all paper and black ink cartridges and other consumables reasonably required by the Employer's Agent".

PSAB 5 CONSTRUCTION

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 5 OF SANS 1200 AB:

PSAB 5.6 SURVEY EQUIPMENT

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

Where required by the Employer's Agent, the Contractor shall, at his own cost, promptly arrange for the recalibration of survey equipment provided".

Employer:		Contractor:	
Witness:		Witness:	



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PSC SITE CLEARANCE

PSC 3 MATERIALS

PSC 3.1 DISPOSAL OF MATERIALS

ADD THE FOLLOWING:

"The Contractor shall obtain his own dumping sites for the disposal of material and all transport costs shall be included in the rates tendered for site clearance".

PSC 5 CONSTRUCTION

PSC 5.1 AREAS TO BE CLEARED AND GRUBBED

ADD THE FOLLOWING:

"Small diameter pipeline routes shall be cleared to a distance of 1,0m on both sides of the pipeline centre line and large diameter pipeline routes shall be cleared to a distance of 2,0m on both sides of the pipeline centre line. Route pegs or markers shall not be destroyed or damaged during clearing operations".

PSC 5.2 CUTTING OF TREES

PSC 5.2.3 Preservation of trees

PSC 5.2.3.2 Individual trees

REPLACE THE LAST SENTENCE WITH THE FOLLOWING:

"An amount of R 1000.00 will be deducted from moneys due to the Contractor as a penalty for every tree that is damaged or removed unnecessarily".

PSC 8 MEASUREMENT AND PAYMENT

PSC 8.2 PAYMENT

PSC 8.2.1 Clear and grub

REPLACE THE FIRST LINE WITH THE FOLLOWING:

"The area designated by the Employer's Agent to be cleared and grubbed will be measured in square metre to the nearest square metre or", otherwise specified.

PSC 8.2.5 Take down existing fences

REPLACE ITEM 8.2.5 WITH THE FOLLOWING:

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Witness:		Witness:	



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PSC 8.2.5 Take down existing fences:

- (a) Description of fence Unit: m
or km
- (b) Etc for other items

The unit of measurement shall be the metre or kilometre of fence taken down and removed from the site.

The rate shall cover the cost of taking down the complete fence (fence height up to 2m) as scheduled and removing all fence material from the site, filling of holes, levelling ground surfaces and cleaning the site as well as providing temporary fence during construction".

PSC 8.2.8 Demolish and remove structures/buildings and dismantle steelwork, etc.

REPLACE "Unit: sum" WITH "Unit: sum or number of m²".

REPLACE THE LAST SENTENCE WITH:

"The rate shall cover the cost of all such separate items as scheduled in the Schedule of Quantities".

ADD THE FOLLOWING ITEMS:

PSC 8.2.11a Temporary fencing or hoarding:

- (a) Indicate temporary usage, description and type
Unit: m
- (b) Etc for other usage and types.

The unit of measurement shall be the linear metre of fence or hoarding supplied and erected, and in the case of temporary fencing for maintaining and removing on completion of the works or part of the works.

The tendered rate shall include full compensation for the cost of supplying and erecting the complete fence as specified or scheduled and in the case of temporary fencing for taking down the fences, removing from the site, filling of holes, levelling ground surfaces and cleaning the site.

Seventy per cent (70%) of the tendered rate shall be payable on completion and approval of the temporary fences, and the remaining thirty per cent (30%) on completion of the removal of the fences.

PSC 8.2.11b Removal of man-made surfaces

The rate shall cover all plant, labour, material, saw cutting (asphalt and concrete), breaking up, lifting, loading, transportation, off-loading surfacing and storing (where applicable).

Unit: m²

Roadways, Asphalt and other layers

- i) Asphalt ($\leq$ 50mm thick) and including base, sub-base and subgrades layers up to 800mm deep.

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- ii) Asphalt ($> 50 \leq 100$ mm thick) and including base, sub-base and subgrades layers up to 800mm deep.

- a) Footways and driveways.

Asphalt ≤ 50 mm thickness.

Asphalt $> 50 \leq 100$ mm thickness.

Interlocking concrete segmental paving blocks (all colours).

Concrete slabs (450 x 450 mm).

Brick paving.

Unreinforced concrete ≤ 75 mm thick.

Reinforced concrete ≤ 75 mm thick.

Grassing

Kerbing (all types of kerbing)..... (Unit: m)

PSC 8.2.12 **Backfilling and reinstatement of man-made surfaces**

The rate shall cover the cost of all associated plant, labour, material, loading, transportation from storage, off-loading and placing (levelling and compacting where applicable) the following materials in roadways, footways and driveways in accordance with the COP:

PSC 8.2.12.1 **Backfilling and reinstatement of roads**

Unit:m²

a) Scenario A

- i) 150mm base – G2 Graded crushed stone to 102% Mod AASHTO density.
- ii) 150mm subbase – G5 Graded crushed stone to 97% Mod AASHTO density.
- iii) 150mm Fill – G7 material compacted to 95% Mod AASHTO density.
- iv) 150mm selected subgrade – Insitu material compacted to 90% Mod AASHTO.

b) Scenario B

- i) 150mm base – G2 material compacted to 97% Mod AASHTO density.
- ii) 150mm subbase – C4 Stabilised gravel material to 95% Mod AASHTO density*.
- iii) 150mm selected subgrade - Insitu material compacted to 93% Mod AASHTO.

***Rate shall include stabilization agent.**

c) Scenario C (Foot paths)

- i) 150mm base – Recovered material compacted to 93% Mod AASHTO.
- ii) 150mm selected subgrade – Insitu material compacted to 90% Mod AASHTO.

d) Surfacing

- i) 30mm Bitumen hot –mix: Fine.
- ii) 70mm Bitumen hot –mix: BTB.

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Witness:		Witness:	



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PSC 8.2.12.2 Backfilling and reinstatement footways

- a) Using removed materials:
 - i) Interlocking concrete segmental paving blocks (all colours).
 - ii) Concrete slabs (450 x 450mm)
 - iii) Brick paving
 - iv) Grassing
 - v) Kerbing.....
(Unit:m)
- b) Using new supplied materials:
 - i) 30mm Bitumen hot –mix: Fine
 - ii) Interlocking concrete segmental paving blocks, including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint and blocks
 - 1) Grey blocks
 - 2) Coloured blocks
 - iii) Concrete slabs (450 x 450mm) including a 20mm river sand bedding layer, jointing mortar.
 - iv) Brick paving including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint and bricks.
 - v) Unreinforced concrete $\leq 75\text{mm}$ thick (15MPa)
 - vi) Reinforced (395 mesh) concrete $\leq 75\text{mm}$ thick (15MPa)
 - vii) Grassing
 - viii) Concrete channelling, including formwork, levelling and compacting 300 x 125mm cast in situ concrete of 15MPa.
 - ix) Kerbing, including a 50mm bedding (cement and river sand), jointing mortar and 15MPa concrete haunching at all joints. (Unit:m)
 - 1) Figure 1
 - 2) Figure 7
 - 3) Figure 8
 - 4) Figure 12

PSC 8.2.13 Reinstatement of existing masonry walls and steel palisade fences

The rate shall cover the cost of reinstating existing masonry walls, plastered or unplastered, and steel palisade fences (including any gates) including plant, labour, material, on-loading, transporting, off-loading and cleaning for the following:

Unit: m²

- a) Face brick
 - i) 110mm wall
 - ii) 220mm wall
 - iii) 330mm wall
- b) Plastered
 - i) 110mm wall
 - ii) 220mm wall
 - iii) 330mm wall
- c) Steel palisade fences (height = 2.1m)

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Witness:		Witness:	



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PSD EARTHWORKS

PSD 2 INTERPRETATIONS

PSD 2.1 SUPPORTING SPECIFICATIONS

REPLACE SUBCLAUSE 2.1.2 WITH THE FOLLOWING:

"PSD 2.1.2: Any of the other SANS 1200 Specifications may form part of the Contract Documents".

PSD 2.3 DEFINITIONS

REPLACE THE WORD AND THE DEFINITION FOR "Borrow" WITH THE FOLLOWING:

"Borrow material: 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".

REPLACE THE DEFINITION FOR "Specified density" WITH THE FOLLOWING:

"Specified density: The specified dry density expressed as a percentage of modified AASHTO dry density".

REPLACE THE DEFINITION FOR "Stockpile" WITH THE FOLLOWING:

"Stockpile (verb): The process of selecting and, when necessary, loading, transporting and off-loading material in a designated area for later use for a specific purpose".

ADD THE FOLLOWING DEFINITIONS:

"Commercial source: A source of material provided by the Contractor, not the Employer, and including any borrow pit, provided by the Contractor.

Fill: An embankment or terrace constructed of material obtained from excavations or borrow pits. 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, the pavement layers, are constructed".

PSD 3 MATERIALS

PSD 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PSD 3.1.1 Method of classifying

ADD THE FOLLOWING:

"The classification of material other than 'soft excavation' shall be agreed upon before excavation may commence.

The Contractor shall immediately inform the Employer's Agent if and when the nature of the material being excavated changes to such an extent that a new classification is warranted for further excavation. Failure on the part of the Contractor to advise the Employer's Agent in good time shall entitle the Employer's Agent to reclassify, at his discretion, such excavated material".

Employer:		Contractor:	
Witness:		Witness:	



ADD THE FOLLOWING NEW SUB CLAUSES:

PSD 3.1.3 CLASSIFICATION FOR HAND EXCAVATION

Classification of material for various types of hand excavation will be based on the results of a dynamic cone penetrometer. The category of material shall be determined by testing the material at regular intervals and at various depths along the centre line of the trench. A minimum of 5 tests shall be done at each location and the average number of blows of the tests shall be used to determine the category of material.

The interval between test locations shall be determined by the variation of material type but shall not exceed 50m. The depth of testing shall be determined by the variation of material type and can increase or decrease in hardness with increasing depth of excavation. Table PSD 3.1.3 indicates the categories:

TABLE PSD 3.1.3: Classification for Hand Excavation

Category of Material	Consistency		DCP Blows to Penetrate 100mm	
	Granular	Cohesive	Granular	Cohesive
<u>Soft</u> Soft excavation shall be excavation in material that can be efficiently removed from the trench using a pick and shovel but not requiring prior breaking using mechanical equipment such as pavement breakers	Up to medium dense	Firm to stiff	0-6	1-5
<u>Intermediate</u> Intermediate excavation shall be excavation in material that require loosening with a hand spike (gwala) before being removed from the trench	Dense	Stiff to very stiff	7-15	6-8
<u>Hard</u> Hard excavation shall be excavation in material that requires prior breaking using mechanical equipment, such as pavement breakers with clay spades, before being removed from the trench.	Very dense		16-50	-15
<u>Rock</u> Rock excavation shall be excavation in material other than described above which by nature of the material requires prior breaking using mechanical equipment, such as pavement breakers with moil points,	-	-	>50	>15

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before being removed from the trench				

PSD 3.2.3 Material suitable for backfill or fill against structures

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"Material used for backfill behind structures shall generally be the material excavated, subject to the following conditions:

- (a) The material shall not contain an excessive number of stones retained on a 50 mm sieve.
- (b) The material shall not contain large clay lumps that do not break up under the action of the compaction equipment.
- (c) The liquid limit of the material shall not exceed 40, neither shall the Pi exceed 18."

PSD 3.3 SELECTION

ADD THE FOLLOWING SUBCLAUSE:

PSD 3.3.3 Selection in borrow pits and excavations

Approval of a borrow area for a certain purpose does not necessarily mean that all the material in that area is suitable for the specified purpose. What it does mean is that the borrow area contains some suitable material. The onus shall rest on the Contractor to ensure that only material that is indeed suitable is removed and used for the specified purpose.

When the Contractor has to select excavated material 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 5 CONSTRUCTION

PSD 5.1 PRECAUTIONS

PSD 5.1.1 Safety

PSD 5.1.1.1 Barricading and lighting

REPLACE "Machinery and Occupational Safety Act, 1983 (Act 6 of 1983)" WITH "Occupational Health and Safety Act, 1993 (Act 85 of 1993)".

REPLACE SUB-PARAGRAPH (a) AND (b) WITH THE FOLLOWING AND ADD SUB-PARAGRAPH c):

- a) adequately protected by a barrier or fence comprising fluorescent orange plastic netting of height at least 1 000 mm and as close to the excavation as practicable; and

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- b) provided with notice boards marked "CLOSED – GESLUIT" at each end of closed or partially closed roads; and
- c) provided with flashing orange lights, placed at 15m intervals along the barricading at night.

ADD THE FOLLOWING TO THIS SUBCLAUSE:

Should the Contractor fail to provide adequate lighting, signing and barricading, access to properties, or leave the site in a dangerous condition, the Employer's Agent shall be entitled to suspend all work under the Contractor until in the Employer's Agent's opinion the Contractor's obligation in these respects have been fulfilled and/or arrange for any emergency work to be carried out by some other agency and to deduct the cost of this work from any monies due to the Contractor.

PSD 5.1.1.2 Safeguarding of excavations

REPLACE "Machinery and Occupational Safety Act" IN SUB-PARAGRAPH (a) WITH "Occupational Health and Safety Act, 1993 (Act 85 of 1993)."

ADD THE FOLLOWING TO SUB PARAGRAPH (d):

Loose ground, materials, tools and appliances shall be kept clear of the edge of the excavations and a pathway at least 0,30 m shall be left clear along the edge of the excavation.

PSD 5.1.1.3 Explosives

REPLACE THE CONTENTS OF THIS SUBCLAUSE AS FOLLOWS:

Where blasting is resorted to, it shall be carried out strictly according to Explosives Act and Regulations 1956 (Act No. 26 of 1956, as amended). However, in no case will blasting be allowed if a reasonable possibility exists of injury to any foundation, wall, pipe, cable or any structure, complete or partly complete. Where the Employer's Agent considers blasting to be dangerous, the same shall not be permitted and his decision shall be final and binding.

Wherever blasting is permitted and resorted to in the vicinity or within the limits of existing townships, roads, etc., it shall only be executed under the cover of sufficient earth backfill, heavy wire mesh screens or rubber matting of adequate weight and area to prevent the blasted material from being ejected from the trench. If any damage should occur, the Contractor shall carry out remedial work arising from such damage and will be held to have allowed therefore in his price.

The Contractor shall undertake such blasting so that the Peak Particle Velocity (PPV) as measured at the closest point to the existing outfall sewer and or building structure shall not exceed 25mm/s. Each blast shall be monitored and the findings recorded by an appropriately qualified explosives expert using a suitably calibrated apparatus. The Contractor shall also timeously inform the relevant inspectorate and obtain the required blasting permit from the South African Police Services, Division of Explosives before proceeding with any blasting on site. If in the opinion of the Employer's Agent, the Contractor makes careless use of explosives, he may forbid the Contractor the use of explosives.

It is a condition that should blasting result in the disturbing of material outside the trench, the Employer's Agent will require the Contractor to remove the disturbed material and backfill it to a compaction standard of the natural in-situ material. All this work for correcting areas of disturbed material will be done at the Contractor's cost.

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The schedule rate for hard rock excavation shall cover all costs incurred in connection with supply, transportation, storage and handling of explosives, the related blasting costs and any remedial work should this be required.

PSD 5.1.1.4 Hard rock excavation without using explosives

ADD THE FOLLOWING TO THIS CLAUSE:

It is a condition that should blasting result in the disturbing of structures outside the trench; the Employer's Agent will require the Contractor to remove the rock material by means of pneumatic or hydraulic breakers, e.g. jack-hammers or wood-peckers.

The schedule rate for hard rock excavation without using explosives shall cover all costs incurred in connection with supply of specialist equipment, the transportation to and from the site as well as the removal and disposal of the hard material should this be required.

PSD 5.1.2 Existing services

PSD 5.1.2.2 Detection, location and exposure

REPLACE THE CONTENTS OF SUBCLAUSE 5.1.2.2 WITH THE FOLLOWING:

"The exposure by the Contractor of underground services, as required in terms of subclause 5.4 of SANS 1200 A (as amended) shall be carried out by careful hand excavation at such positions and to such dimensions as are agreed to by the Employer's Agent.

Unless otherwise instructed or agreed by the Employer's Agent, no service shall be left exposed after its exact position has been determined and all excavations carried out for the purposes of exposing underground services shall be promptly backfilled and compacted to the following densities:

- (a) In roadways: 93% Mod AASHTO density; and
- (b) In all other areas: 90% Mod AASHTO density.

Where hand excavations to expose underground services have to be carried out in roadways, the Contractor shall reinstate the road layer works in accordance with the provisions of subclause 5.9 of SANS 1200 DB.

Payment in respect of exposing the services by means of hand excavation as described above, will be made in accordance with subclause PSA 8.8.4

Payment in respect of reinstating layer works in roadways will be made in accordance with subclause 8.3.6.1 of SANS 1200 DB."

PSD 5.1.2.3 Protection of cables

REPLACE SUBCLAUSE 5.1.2.3 WITH THE FOLLOWING:

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PSD 5.1.2.3 Protection during construction

Further to the requirements of subclause 5.4.2 of SANS 1200 A (as amended), major excavating equipment and other plant shall not be operated dangerously close to known services. Where necessary, excavation in close proximity to known services shall be carefully carried out with suitable hand tools, excluding picks wherever their use could damage the services. No additional payment will apply to such more difficult work.

Should any service not being a known service be discovered or encountered during the course of the Contract, the Contractor shall, in addition to complying with the requirements of subclause 5.4.2 of SANS 1200 A (as amended), immediately notify the Employer's Agent thereof and implement such measures as will prevent damage of such service or, if it was damaged in the course of discovery, will prevent and minimize the occurrence of any further damage occurring."

PSD 5.1.2.4 Negligence

DELETE SUB-CLAUSE 5.1.2.4

PSD 5.1.3 Stormwater and Groundwater

ADD THE FOLLOWING TO THE SUB-CLAUSE:

"The Contractor shall, where applicable and at the earliest practicable opportunity, install the permanent drainage specified or shown on the drawings and shall at his own cost provide the temporary drainage required to protect the Works".

PSD 5.1.4 Nuisance

PSD 5.1.4.3 Excavated material not to endanger or interfere

AMEND THE CLAUSE AS FOLLOWS:

"A safe, clear path shall be kept open at all times for pedestrians. Equipment, materials and waste shall be stored, stockpiled or removed in such a manner that pedestrians are not endangered and that the nuisance level is kept to a minimum. If construction activities occupy the whole footway and verge area so that pedestrians are forced to walk in the traffic lane, adequate protection from traffic shall be provided.

Where instructed by the Employer's Agent or where the Works impose a danger to traffic or pedestrians, the Contractor shall at his own cost remove off Site excavated material to temporary stockpiles (approved by the Employer's Agent) and the return to Site, excavated material for use as backfill or bedding".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSD 5.1.4.4 Open Trenches

Unless otherwise permitted and where relevant, not more than the 100 m of trench in one place shall be opened ahead of the completed and backfilled pipeline".

PSD 5.1.5 Reinstatement and Maintenance of Roads

ADD THE FOLLOWING TO THE SUB-CLAUSE:

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"Where crossings have been made, the roads shall be reinstated in accordance with the details specified in subclause 5.9 of SANS 1200 DB."

PSD 5.1.6 Road Traffic Control

DELETE THE SECOND SENTENCE OF SUBCLAUSE 5.1.6

PSD 5.2 METHODS AND PROCEDURES

PSD 5.2.2 Excavation

PSD 5.2.2.1 Excavation for general earthworks and for structures

ADD THE FOLLOWING TO PARAGRAPH (b):

"When the nature of the material precludes the above procedure, additional excavations shall be carried out to provide working space for the erection of formwork. The rate tendered for item 8.3.5 will be deemed to include the cost of a working width of 600 mm, but the Contractor may excavate a greater working width at no additional cost to the Employer".

REPLACE THE CONTENT OF PARAGRAPH (e) WITH THE FOLLOWING:

"Where excavations have been carried below the authorised levels, the Contractor shall backfill such excavations to the correct level with approved gravel compacted to 90% of modified AASHTO density or to the density of the surrounding material.

Where excavations have been carried out in hard material, the Employer's Agent may direct the over-excavation to be backfilled with weak concrete if there is a danger of settlement or differential settlement of the foundations.

Where the sides of excavations against which concrete is to be cast have been over-excavated or have collapsed partially, the Contractor shall retrim the excavations if necessary and, unless other remedial measures are agreed to by the Employer's Agent, shall cast the concrete for the structure, including the additional concrete that may be required as a result of the over-excavation or partial collapse. The cost of the additional concrete or remedial measures shall be for the Contractor's account".

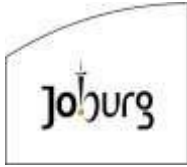
PSD 5.2.2.3 Disposal

REPLACE THE SECOND SENTENCE WITH THE FOLLOWING:

"The Contractor shall provide all necessary spoil sites for the spoiling of all surplus and unsuitable materials and shall make the necessary arrangements with the owner of the site where the material is disposed of, and pay all charges and levies as may be applicable for the use of such spoil sites.

Every spoil site provided by the Contractor shall be approved by the local authority in whose area it is located, and the spoiling shall comply with the applicable statutory and municipal regulations as well as the requirements of the owner of the spoil site.

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Payment to the Contractor in respect of locating and making arrangements for suitable spoil sites and spoiling material at such sites will be made in accordance with the provisions of subclause PSD 8.3.14."

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ADD THE FOLLOWING SUBCLAUSE IN SUBCLAUSE 5.2.2:

PSD 5.2.2.4 Selection and stockpiling

Approval or designation of the material in a particular borrow pit or excavation for a particular purpose does not imply that all the material in the borrow pit or excavation is suitable for the particular purpose to which the said approval or designation relates, nor that all material in the borrow pit or source should be used for the particular purpose. The Contractor shall select suitable material from that borrow pit or source, discard unsuitable material and reserve material for other purposes as necessary.

The Contractor shall organize and carry out his operations in such a manner as will prevent the contamination of suitable embankment and backfill material with unsuitable materials. Any excavated material which becomes, in the Employer's Agent's opinion, unsuitable for use in embankments or backfill as a result of contamination, shall be disposed of in a manner acceptable to the Employer's Agent and shall be replaced by the Contractor with materials acceptable to the Employer's Agent, all at the Contractor's cost".

PSD 5.2.5 Transport for earthworks

REPLACE THE CONTENT OF SUBCLAUSE WITH THE FOLLOWING:

"The transport of all excavated materials, irrespective of the distance and source, shall be deemed to be free-haul, the cost of which is included in the Contractor's tendered rates and prices for the excavation of the materials. No separate compensation shall apply for the transportation of excavated materials".

PSD 7 TESTING

PSD 7.2 TAKING AND TESTING OF SAMPLES

REPLACE THE CONTENT OF THIS SUBCLAUSE WITH THE FOLLOWING:

"The Contractor shall arrange with the approved independent laboratory by the Contractor to carry out sufficient tests on a regular basis as agreed between him and the Employer's Agent to determine whether the degree of compaction, and, where applicable, the quality of materials used, comply with the specifications and shall submit the results of these tests to the Employer's Agent in a form approved by him.

The compaction requirements for fills shall be deemed complied with when at least 75% of the dry-density tests on any lot show values equal to or above the specified density and when no single value is more than five percentage points below the specified value".

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PSD 8 MEASUREMENT AND PAYMENT

PSD 8.3 SCHEDULED ITEMS

PSD 8.3.1 Site preparation

REPLACE SUBCLAUSES 8.3.1.1 AND 8.3.1.2 WITH THE FOLLOWING:

“Where site preparation such as clearing, grubbing, the removal of large trees or the removal and stockpiling of topsoil is required, the provisions and scheduled items of SANS 1200 C shall apply.”

PSD 8.3.2 Bulk Excavation

- (a) Excavate in all materials for trapezoidal drainage channel with depth 1m, bottom width 1 m and top width 2m, dispose and stockpile as ordered by Engineer
Unit : m³

PSDB EARTHWORKS (PIPE TRENCHES)

PSDB 3 MATERIALS

PSDB 3.5 BACKFILL MATERIALS

ADD THE FOLLOWING PARAGRAPHS TO SUBCLAUSE:

(c) Cement-stabilised backfilling

Backfilling shall, where directed by the Employer's Agent, be stabilized with 5% cement. The aggregate shall consist of approved soil or gravel containing stones not bigger than 38 mm and with a plasticity index not exceeding 10.

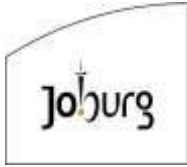
The soil or gravel shall be mixed with 5% cement and shall be compacted in layers of 100 mm thick to 90% of modified AASHTO density.

(d) Soil-crete backfilling

The aggregate for soil-crete shall be mixed with 5% cement and shall consist of approved soil or gravel containing stones not bigger than 38 mm and with a plasticity index not exceeding 10.

The soil or gravel shall be mixed in a concrete mixer with the cement and enough water to acquire a consistency that allows the mixture to be placed with vibrators to fill all voids between the pipe and the sides of the trench. Shuttering shall be used where necessary”.

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PSDB 3.7 SELECTION

REPLACE THE WORDS “If he so wishes” IN THE FIRST LINE OF THE SECOND PARAGRAPH WITH THE WORDS “at his own cost”.

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Witness:		Witness:	



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PSDB 5 CONSTRUCTION

PSDB 5.1 PRECAUTIONS

PSDB 5.1.2 Stormwater, Seepage and Dewatering of Excavation

PSDB 5.1.2.3 Sloping ground

ADD THE FOLLOWING SENTENCE AT THE END OF THE PARAGRAPH:

"All trench excavations on sloping embankments shall be backfilled in accordance with 5.6.2 over the full extent of the actual trench excavation and to the original embankment ground level".

PSDB 5.1.3 Accommodation of traffic and access to properties

REPLACE THE SEMICOLON AND THE WORD "and" AT THE END OF THE SUBCLAUSE 5.1.3 (a) WITH A FULL STOP AND REPLACE ITEM (b) WITH THE FOLLOWING:

- "(b) Where necessary to achieve compliance by the Contractor with his obligations to provide and maintain pedestrian and vehicular access to properties affected by the works, the contractor shall construct and maintain to the satisfaction of the Employer's Agent, such temporary access roads around, and/or steel or timber bridges over excavations in roads, pavements, entrances or accesses to properties.

The Contractor shall make available on site at all times a sufficient number of steel plates at least 2.0m x 2.0m x 8mm thick to be laid across open trenches to provide access to private properties. The cost of providing, placing and removing the steel plates shall be included in the rates for trench excavation.

On completion of the work, the Contractor shall dismantle and remove all such temporary constructions and reinstate these areas to their former condition.

Except only where the Employer's Agent has included in the Schedule of Quantities, particular payment items specifically therefore, the Contractor will not be paid directly for the construction and maintenance of temporary access roads and/or the provision and maintenance of bridges as aforementioned, and the costs thereof shall be deemed included in the Contractor's tendered rates for excavation".

ADD THE FOLLOWING NEW SUBCLAUSE TO SUBCLAUSE 5.1:

PSDB 5.1.5 Removal of existing pipelines

Where existing pipes have to be removed, they shall be carefully opened up by machine excavation to 300 mm above the pipes after which the whole pipe shall be fully exposed by means of hand excavation. The excavation width shall comply with subclause 8.2.3.

The pipes shall be removed from the trench in a manner approved by the Employer's Agent and brought to the surface for inspection by the Employer's Agent.

Pipes that are declared suitable for reuse and pipes declared unfit for reuse shall be dealt with in an applicable manner described in the specifications, or on the Drawings or on the Employer's Agent's instructions, as relevant".

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PSDB 5.2 MINIMUM BASE WIDTHS

ADD THE FOLLOWING SUB PARAGRAPH TO:

- c) Should the excavated trench width exceed the specified side allowance on each side of the pipe of 400mm by a value greater than 400mm, remedial measures shall be as directed and shall be provided at the Contractor's cost unless it can be shown that such excess width is due to factors beyond the Contractor's control.

Trench widths should be as near vertical as possible in order to minimize the quantity of selected fill material to be provided".

PSDB 5.4 EXCAVATION

ADD THE FOLLOWING SUB CLAUSES:

PSDB 5.4.1 Principles

- "a) The cost of trimming excavations by hand or machine shall not be paid for separately but shall be included in the rates tendered for excavation.
- b) All excavated material shall be kept within defined limits and shall, wherever possible, be deposited alongside the trench. The material shall be deposited so as to leave a clear strip of at least one metre between the edge of the trench and the excavated material and shall not cause undue inconvenience to traffic and property owners. The material shall be placed and kept well clear of all manhole covers, culvert in- and outlets, fire hydrants, benchmarks, stand pegs, fences, etc.
- c) To prevent vertical trench walls from collapsing, excavated material shall, wherever possible, not be stacked on the side of any underlying strata sloping down towards the trench and in this regard attention is specifically drawn to the shales sloping south to north in the Pretoria area.
- d) Excavations more than 1,5 m deep shall be adequately shored or braced to support the overhanging material and other loads which may occur. If the Contractor is of the opinion that shoring or bracing for an excavation of depth of more than 1,5 m is not necessary, he shall notify the Employer's Agent accordingly in writing, including a report from a professional Employer's Agent or a professional technologist competent in excavations. The report shall include the relevant laboratory tests.
- e) The Contractor shall provide all the open and close timbering, strutting and shoring required for the safety of the excavations and structures adjacent to the trenches, and shall be solely and wholly responsible for ensuring the adequacy of these measures for this purpose.

Without in any way affecting or detracting from the Contractor's responsibility, the Employer's Agent shall have the right to instruct the Contractor to provide additional or improved timbering, shoring or strutting where he considers this to be necessary. The Contractor shall have no claim for additional payment on this account.

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The shoring method adopted shall be compatible with the soil type and the excavating, backfilling and pipe-laying methods adopted and shall not place any undue restrictions on the laying of the pipes.

Timbering and shoring shall be left in position until the Employer's Agent has authorised their removal.

- f) Shoring and bracing may not be necessary where the Contractor elects to slope the sides of the excavation to at least the maximum angle of repose measured relative to the horizontal plane, as determined by laboratory tests. Sloping of the sides could be combined with steps. The Contractor will submit the proposed excavation profile to the Employer's Agent for approval.
- g) The cost for shoring, bracing and sloping of the sides will be included in the rates tendered for excavation. The cost for the services of a professional Employer's Agent or a professional technologist, including the relevant laboratory costs, shall be included in the tendered rates.
- h) The Safety officer, or another competent person appointed by the Contractor in writing, shall inspect every excavation, including bracing and shoring:
 - (i) daily, prior to each shift;
 - (ii) after every blasting operation;
 - (iii) after an unexpected fall of ground;
 - (iv) after substantial damage to supports; and
 - (v) after rain,

in order to pronounce the safety of the excavation to ensure the safety of persons, and those results are to be recorded in a register kept on site and made available to an inspector, the Employer, Employer's agent, contractor or employee upon request;
- i) Each excavation which is accessible to the public or which is adjacent to public roads or thoroughfares, or whereby the safety of persons may be endangered, shall be
 - (i) adequately protected by a barrier or fence of at least one metre in height and as close to the excavation as is practicable; and
 - (ii) provided with warning illuminants or any other clearly visible boundary indicators at night or when visibility is poor".

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PSDB 5.4.2 Hand Excavatability

PSDB 5.4.3 Excavation of Asphalt Surfaces

The existing asphalt road surfacing shall be saw-cut prior to excavation commencing for the full width of the trench as specified on the construction drawings so as to ensure a neat finish to the reinstated surfacing.

PSDB 5.6 BACKFILLING

PSDB 5.6.3 Disposal of Soft Excavation Material

DELETE THE EXISTING CLAUSE AND REPLACE WITH:

"The Contractor shall locate and negotiate for tipping sites for the disposal of surplus material and bear all costs in connection therewith. Arrangements for the consent of the owner of a property to deposit spoil and or temporary spoil thereon shall be confirmed in writing. Such arrangements shall be approved before being implemented. All spoil sites shall be neatly finished off and compacted to 90% of MOD.AASHTO density".

PSDB 5.6.6 Completion of Backfilling

ADD THE FOLLOWING:

Backfilling should not lag more than 50m behind the laying operation.

PSDB 5.7 COMPACTION

ADD THE FOLLOWING:

"Where pipelines cross existing gravel roads, backfilling shall be carried out as specified in Subclause 5.7.2 and payment therefore will be made under sub item 8.3.3.3."

PSDB 5.9 REINSTATEMENT OF SURFACES

ADD THE FOLLOWING TO THIS SUB CLAUSE:

PSDB 5.9.2 Private Property and Commonage

The ground and paved surface of servitudes, parks, driveways, roadways and sidewalks shall be reinstated to at least the standard and conditions as existed previously.

Grass sods shall be cut out from the grassed areas to be excavated and shall be set aside, preserved and kept damp until used for reinstatement. All other material to be used for reinstatement shall be suitably stored for such purpose.

The rate for reinstatement of block paved surfacing shall include all costs for the supplying and laying of the surfacing. The rate shall also cover for taking brick paving out carefully, stockpiling and replacement with new if bricks are broken or damaged. The rate must furthermore provide for all plant, labour and material costs associated with the work.

The rate for reinstatement of asphalt or concrete paved surfacing shall include all costs for the saw cutting, supplying and laying of the surfacing. The rate shall also cover for removal and spoiling of

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the material. The rate must furthermore provide for all plant, labour and material costs associated with the work.

The width of any trench through an area paved with bricks or precast concrete units shall be the minimum practicable width that, in the opinion of the Employer's Agent, can be removed without cutting bricks or precast units.

PSDB 5.9.4 Bitumen roads: Sub-base and Base

DELETE THIS SUB CLAUSE AND REPLACE WITH THE FOLLOWING:

Johannesburg Roads Agency will reinstate all asphalt surfaces. Refer to PS 6.7.

ADD THE FOLLOWING NEW SUB CLAUSES:

PSDB 5.9.7 Construction of Layers for Footways

The reinstatement of the paving blocks shall be the responsibility of the Contractor. The reinstatement and backfilling of pavement layers shall be done in accordance with PS 6.7

ADD THE FOLLOWING NEW SUB CLAUSES:

PSDB 5.9.8 Existing Kerbs and Channels

"Where excavations have to cross existing kerbs and channels, then:

- a) In the case of a precast kerb and channel the kerb, segmented paving blocks and channel shall be carefully removed and stored so as to avoid any damage to or theft of the kerb and channel, and replaced after the excavation has been backfilled. Any damage to or theft of the kerb and channel shall be made good by the Contractor at his expense.
- b) In the case of cast insitu or extruded insitu kerb and channel the kerb and channel shall be cut with a diamond tipped saw and carefully removed so as to avoid any damage to the remaining kerbs and channels. After the excavation has been backfilled the portion of kerb and channel removed shall be replaced with a cast insitu kerb and channel of the same profile as the existing kerb and channel".

ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.11 LOCATION OF EXISTING SERVICES

Positions and details of known existing services as received from the various Departments are indicated on the Construction Drawings. Exact positions cannot be guaranteed by The Employers who will not be held responsible for any damages to any services. The Contractor shall excavate by hand to locate any such services and ensure that care is taken not to damage these services.

ADD THE FOLLOWING NEW SUB-CLAUSE:

Employer:		Contractor:	
Witness:		Witness:	



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PSDB 5.12 DEALING AND PROTECTING EXISTING SERVICES

All existing services, underground as well as above ground level, shall be protected by the Contractor in an appropriate manner, for the duration of the construction or as deemed necessary by the Employer's Agent, such that no damage to or interruption of the services shall occur.

ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.13 GAS MAIN, ELECTRICITY AND TELECOMMUNICATION POLES

Gas mains, electricity and telecommunication poles along the pipe route are to be stabilised and protected prior to excavation and for the duration of construction.

ADD THE FOLLOWING NEW CLAUSE:

PSDB 5.14 TREES IN CONSTRUCTION PATH

Whenever possible any trees that lie within the construction path, shall not be removed and care shall be exercised to avoid damaging them. If the Contractor considers the removal of any tree unavoidable he/she shall obtain in writing the approval of the Employer's Agent and the Environmental Consultant prior to removal of any trees. Rates to cover removal and replacement where practical are provided in the schedule of quantities. A penalty of R1, 000.00 will be applied for any unauthorized or unnecessary damage to any tree which in the opinion of the Employer's Agent could have been avoided.

ADD THE FOLLOWING NEW SUBCLAUSE 5:

PSDB 7 TESTING

ADD THE FOLLOWING NEW SUBCLAUSE:

PSDB 7.2 Inspection at Intermediate Stages of Construction

The Contractor shall call the Employer's Agent, giving him reasonable notice, to inspect the works at the following intermediate stages of construction:

- a) After completion of the trench excavation and preparation of the trench bottom and before any pipe is laid.
- b) After the selected backfill material has been placed around the pipe and before the remainder of the trench is backfilled.
- c) Before placing of premix on roads or any final surfacing on constructed footways. Work shall not progress through the specified stages without the approval of the Employer's Agent or his representative on site.

Failure to comply with the provision of this clause shall result in the suspension of the backfilling work until the testing has been approved by the Employer's Agent".

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PSDB 8 MEASUREMENT AND PAYMENT

PSDB 8.1 BASIC PRINCIPLES

ADD THE FOLLOWING PRARGRAPH:

"The basic principle of measurement and payment for earthworks for a pipe trench is that the rates tendered for excavation shall also cover the cost of trimming, handling and shoring or bracing as specified in clause PSDB 5.4".

PSDB 8.3 SCHEDULED ITEMS

PSDB 8.3.1 Site Clearance and (if specified) Removal of topsoil

RENAME THE FOLLOWING SUB-ITEM:

- c) Removal, stockpiling and replacing of Topsoil (depth stated)
.....Unit: m³

ALSO REPLACE THE LAST SENTENCE OF THIS SUB-ITEM:

"The rate for item (c) shall cover the cost of stripping to the stated depth, stockpiling, maintaining and replacing the topsoil, as well as the prevention of dust nuisance."

PSDB 8.3.2 Excavation

- a) Excavate in all materials, for trenches, backfill compact and dispose of surplus material.

ADD THE FOLLOWING SUB-ITEM:

The rate shall also cover the cost of excavating for trenches using labour intensive construction methods. The rate shall exclude the cost of removal of grass sods and compaction but shall include for the disposal of surplus/unsuitable material. The rate shall, in addition, cover the costs for compliance with the requirements of PSDB 5.4.1.

- b) Extra over item (a) above for:

ADD THE FOLLOWING AT THE END OF THE EXISTING SUB-ITEM 2:

"No payments will be made under sub items (1) and (2) in respect of any materials measured and paid for under sub item 3 below".

AND ADD THE FOLLOWING NEW SUBITEMS IN 8.3.2(b):

- "(3) Hand excavation and backfill where ordered by the Employer's Agent
.....Unit: m³

The unit of measurement shall be the cubic metre of material, measured in place according to the authorised dimensions, which was excavated by the hand on

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the specific prior written instructions of the Employer's Agent; provided always that the Employer's Agent's said instruction shall have stated that measurement and payment for such hand excavation will be in accordance with this item.

The tendered rate shall include full compensation for the additional cost, effort and time resulting from excavating in the respective materials using hand methods only.

The Employer's Agent shall not be obliged to authorise payment under this item in respect of any hand excavation carried out (whether ordered in writing or otherwise), which hand excavation was in any case necessary to achieve compliance by the Contractor with his obligations under the Contract to:

- (i) utilize construction appropriate to the nature of the specific parts of the works; and/or
- (ii) protect existing structures and/or services; and/or
- (iii) comply with all prevailing legislation and regulations.

- (4) Cutting of premix and concrete surfaces..... Unit: m²

The cutting of premix and concrete surfaces shall be measured per square metre of cut as scheduled. Cutting of premix and concrete surfaces shall be done with a diamond tipped saw or by some other approved method. The depth of the cut shall be such that the adjoining premix and concrete surfaces are not disturbed when excavation takes place. The cutting of surfaces shall be done 100mm on either side of the trench.

- (5) Backfill stabilised with 5% cement where directed by the Employer's Agent.....Unit: m³

The unit of measurement shall be the cubic metre of backfill material, measured in place after compaction according to the authorised dimensions, which was stabilised on the Employer's Agent's instructions in accordance with subclause PSDB 3.5(c).

The tendered rate shall include full compensation for supplying the cement and for selecting, mixing, backfilling and compacting the stabilised material to 90% of modified AASHTO density.

- (6) Soil-crete backfill where directed by the Employer's Agent Unit: m³

The unit of measurement shall be the cubic metre of soil-crete placed on the Employer's Agent's instructions in accordance with subclause PSDB 3.5(d), measured in place according to the authorised dimensions.

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The tendered rate shall include full compensation for supplying the cement and for selecting, mixing and placing the soil crete as well as for the cost of shuttering if required".

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Witness:		Witness:	



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AND ADD THE FOLLOWING NEW SUBITEMS IN 8.3.2:

- (d) Widening and deepening in all materials, for valve chambers and dispose of surplus material
.....Unit: m³

The unit of measurement shall be the cubic metre of material, measured in place according to the authorised dimensions, but excluding the displaced volume of the pipe, already taken into account in item (a) above.

- (e) Extra-over item (d) above for

(1) Intermediate Rock.....
Unit: m³

(2) Hard Rock.....
Unit: m³

PSDB 8.3.3 Excavation ancillaries

PSDB 8.3.3.1 Make up deficiency in backfill material (Provisional)

ADD THE FOLLOWING AFTER THE LAST SENTENCE:

"The rates for items (a), (b) and (c) shall also cover the sieving of material if instructed by the Employer's Agent".

ADD THE FOLLOWING SUBITEMS:

(d) Supplying of 38 mm stone from any source as required.....Unit: m³

(e) Supplying soil for soil cement from any source.....
Unit: m³

(f) Crusher run from any source.....
Unit: m³

PSDB 8.3.3.3 Compaction in road reserves

REPLACE THE HEADING OF THIS SUBITEM WITH THE FOLLOWING:

"PSDB 8.3.3.3.3 Compaction in road crossings"

REPLACE THE SENTENCE, "The volume will be measured as specified in 8.2.2, 8.2.3 and 8.3.3.1",

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WITH THE FOLLOWING:

"To determine the volume in the case of gravel roads, 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, and payment will be made under item 8.3.6.1."

PSDB 8.3.3.4 Overhaul

REPLACE THE CONTENTS OF THIS ITEM WITH THE FOLLOWING:

"Measurement and payment shall be in accordance with subclause PSD 5.2.5."

PSDB 8.3.4 Particular items

PSDB 8.3.4(a) Shore trench opposite structure or service

REPLACE THE HEADING OF THIS SUBITEM WITH THE FOLLOWING:

PSDB 8.3.4(a) Shore trench opposite structure or service for depths:

ADD THE FOLLOWING AFTER THE LAST SENTENCE:

"Separate items will be measured for depths of trenches in increments of 1 m. The rate for each stated category shall cover the cost of shoring from ground level up to the full depth of the stated category. Payment for this item will only be made if written instructions were issued by the Employer's Agent over and above the Standard Specifications for safety of excavations as specified in SANS 1200 DB, subclause 5.1."

PSDB 8.3.4(b) Temporary works: Control water inflow from to

REPLACE THIS SUBITEM WITH THE FOLLOWING:

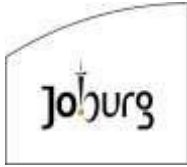
PSDB 8.3.4(b) Accommodation of existing flows for temporary or permanent connections or construction of new structures or pipe trenches:

1) (Description of item stated) Unit:
Sum

2) Etc for other structures

The tendered sums shall include full compensation for any inconvenience suffered, for normal and exceptional risks, for unforeseen eventualities and for maintaining the accommodated flow as long as necessary and shall include for the design and construction of all necessary temporary measures such as additional clearing, grubbing, earthworks, culverts, structures, pipework, pumping, cleaning up and any other associated work that may be required as specified in Clause PS1.5. Where a temporary structure for the accommodation of an existing flow has been designed by the Employer's

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Witness:		Witness:	



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Agent and is to be constructed by the Contractor, payment for such structure shall, unless otherwise stated in the scheduled item, be made under the applicable sub items in this payment item".

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Witness:		Witness:	



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PSDB 8.3.5 Existing services that Intersect or Adjoin a Pipe Trench

PSDB 8.3.5 a) Services that intersect a trench

ADD TO THE FIRST SENTENCE OF THIS SUB CLAUSE AS FOLLOWS:

After "Except where water pipes are to be recovered" add "and water leads for erf connections need to be renewed"

ADD THD NEW SUBCLAUSE PSDB 8.3.5 c) TO CLAUSE 8.3.5 AS FOLLOWS:

PSDB 8.3.5 c) Services that require special care

1)	Description service	Unit: No	of
2)	Etc items	Unit: No	other

The Unit of measurement shall be the number of each service described. Electricity, telecommunication poles and water mains along the pipe route are to be stabilised and protected prior to excavation and for the duration of construction. The rate shall cover the temporary stabilization and protection of electricity and telecommunication poles.

ADD THD NEW SUBCLAUSE PSDB 8.3.6.2 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.2 Reinstatement of surfacing for footways

a)	Brick paving	Unit: m ²
b)	Concrete paving	Unit: m ²
c)	Concrete slabs	Unit: m ²

The Unit of measurement shall be square metre of a reinstated. The rate for reinstatement of footway surfacing shall include all costs for careful removal, replacement of damaged sections and laying of the surfacing using labour intensive construction methods. The rates shall include for the lifting, stockpiling and replacement of broken or damaged bricks, blocks or slabs and shall provide for all plant, labour and material costs associated with the work.

The width of any trench through an area paved with bricks or precast concrete units shall be the minimum practicable width which, in the opinion of the Employer's Agent, can be removed without cutting bricks or precast units.

ADD THE NEW SUBCLAUSE PSDB 8.3.6.3 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.3 Reinstatement of kerbs and channels... Unit: m²

The unit of measurement shall be square metre of area reinstated. The rate shall cover the cost of all labour, plant and material required and shall also include for the disposal of all unsuitable materials.

ADD THD NEW SUBCLAUSE PSDB 8.3.6.3 TO CLAUSE 8.3.6 AS FOLLOWS:

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Witness:		Witness:	



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PSDB 8.3.6.4 Reinstatement of grassed surfaces Unit:
m²

The unit of measurement shall be square metre of area reinstated. The rate shall cover the cost of careful removal of grass sods to a minimum depth of 100mm, stockpiling, maintenance for later re-use and reinstatement thereof".

DELETE THIS SUBCLAUSE AND REPLACE WITH THE FOLLOWING:

PSDB 8.3.6.5 Reinstatement of fence

- a) Description of fence... Unit:
m
- b) Etc for other items

The unit of measurement shall be the metre of fence reinstated complete. The rate shall cover the full compensation, labour, material and ancillary works for the reinstatement.

ADD THIS NEW SUBCLAUSE:

PSDB 8.3.8 Form Firebreaks

Measurement will be in square metres over the area instructed by the Employer's Agent... Unit:
m²

ADD THIS NEW SUBCLAUSE:

PSDB 8.3.9 Discontinue operations unexpectedly and transfer plant, equipment and labour (provisional item)

- (a) Over a route distance not exceeding 280 m..... Unit: No of
transfers

The rate for unexpected discontinuity in operations along the route of the pipeline and transfer, plant, equipment and labour shall include everything necessary to close down in sequence the various operations in the construction train and transfer them to the new working point.

Employer:		Contractor:	
Witness:		Witness:	



PSDK GABIONS AND PITCHING

PSDK 3 MATERIALS

PSDK 3.2 Pitching

PSDK 3.2.1 Stone

REPLACE THE CONTENTS OF TABLE 2 WITH THE FOLLOWING:

“TABLE 2 SIZE AND MASS OF INDIVIDUAL STONES FOR PITCHING

1	2	3	4
Size/mass of pitching	Thickness of pitching Mm, min	Least dimension Mm, min	Mass kg, min
Extra heavy	600	300	180
Heavy	400	190	50
Medium	300	150	27
Light	200	110	11

PSDK 5 CONSTRUCTION

PSDK 5.3.3 Grouted pitching

REPLACE THE WORDS “(Table 4)” IN THE SECOND LINE OF THE FIRST PARAGRAPH WITH “(Table 2)”

Employer:		Contractor:	
Witness:		Witness:	



PSG CONCRETE STRUCTURAL

PSG 3 MATERIALS**PSG 3.2 CEMENT****PSG 3.2.2 Alternative types of cement**

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

“Only sulphate resistant cement shall be used on this project.

If the Contractor wishes to use any other type of cement, he shall obtain the Employer's Agents prior written approval (see 8.1.3.2 and 8.1.3.3.) The tendered rates, however, shall be based on the use of sulphate resistant cement only”.

PSG 3.2.3 Storage of cement

ADD THE FOLLOWING:

“Cement shall not be store for longer than 12 weeks without the Employer's Agents permission”.

PSG 3.4 AGGREGATES

ADD THE FOLLOWING SUBCLUASE:

PSG 3.4.4 Aggregate of dolomatic origin

All aggregates for structural concrete, manholes, pipe encasement, pipe bedding cradles, mass filling, etc. shall be of dolomatic origin. The quantity of insoluble matter in respect of concrete made with aggregates of dolomatic origin, determined according to the method described in SANS 677, Appendix C, shall not be more than 15%.

PSG 4 PLANT**PSG 4.1 GENERAL**

ADD THE FOLLOWING SUBCLAUSE

PSG 4.1.1 Minimum Plant

The contractor shall have the following minimum Plant available and in sound working order:

- (a) Two concrete mixers, each of sufficient capacity to complete a section off the wall between horizontal construction joints within 4 hours and without interruption;
- (b) Two concrete vibrators, at least one of which shall be powered by an internal combustion engine;

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Witness:		Witness:	



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- (c) One air compressor;
- (d) Storage tanks at the water carts or trucks are adequate capacity to ensure that sufficient water will be available before commencement of every major concrete-placing operation.

If the Plant used for placing concrete for the structure of electrically or mechanically powered, the Contractors shall also provide some other approved, non- electrically powered standby means for placing concrete at an adequate rate in the event of a power or mechanical failure of the main Plant.

When the Contractor elects to place a crane inside the walls of the structure during the construction period, shall communicate with the Employer's Agent in good time to ensure that the design and layout of the panels that form the roof slabs and floor allow for such positioning of the crane. When sections of the roof and floor have to be redesigned to accommodate the crane, the redesigned cost shall be borne by the Contractor.

PSG 4.5 FORMWORK

PSG 4.5.1 Design

ADD THE FOLLOWING:

All form work with scaffolding required for any part the works shall be designed by the Contractor, and before commencing with the erection of any formwork or scaffolding, the Contractor shall submit the methods he proposes to use to the Employer's Agent for approval. The Employer's Agent has the authority to order alterations to the design or the sizes of any part of the formwork or scaffolding. The Contractor shall check the safety and suitability of all such alterations. The fact of the Employer's Agent has approved or altered any part of the formwork of scaffolding shall not be construed as relieving the Contractor of his responsibility with regard to the strength and stability of the formwork or scaffolding.

PSG 4.5.3 Ties

ADD THE FOLLOWING:

"No plugs, bolts, ties or clamps of any description used to hold formwork will be allowed into the project or through the concrete unless expressly approved by the Employer's Agent.

Only approved tie-rods consisting of solid rods (that remain embedded in the concrete) and with removable ends shall be used to hold the formwork of the walls. The removable tie-rod ends shall facilitate removal without damage to the concrete, and no permanently embedded parts of such tie-rods shall have less than 50mm of cover to the finished concrete surface.

The cavities left in the concrete when the tie-rod end cones are removed shall soundly caulked with a cement mortar to which an approved shrinkage-reducing agent has been added, and shall be neatly to finished to a smooth surface uniform with that of the surrounding concrete.

The cost of supplying special tie-rods as well as the filling of the cavities left by the tie-rod cones shall be included in the rates tendered for formwork under the appropriate pay items.

On no account shall formwork be secured to reinforcing bars".

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Witness:		Witness:	



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PSG 5 CONSTRUCTION

PSG 5.1 REINFORCEMENT

PSG 5.1.2 Fixing

ADD THE FOLLOWING:

"The Employer's Agent will inspect the reinforcing after it has been fixed in place, the formwork has been cleaned, cover blocks have been positioned, and before concreting commences.

Welding of reinforcing steel will not be permitted".

PSG 5.1.3 Cover

ADD THE FOLLOWING:

"The distance between pipes in the reinforcing steel shall nowhere be less than:

- (a) 40 mm or
- (b) 5 mm plus the maximum size of the coarse aggregate, whichever is the largest

PSG 5.2 FORMWORK

PSG 5.2.5 Removal of formwork

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.2.5.6 The Contractor shall make provision for the continued support of beams and slabs while the formwork is being removed and/or for that propping of beams and slabs".

PSG 5.3 HOLES, CHASES AND FIXING BLOCKS

ADD THE FOLLOWING:

"Cover blocks for reinforcing and fixtures may be placed into the concrete provided that neither the strength nor any other desirable characteristics (such as the appearance) of the concrete section is affected or impaired in the opinion of the Employer's Agent.

The holes or cavities left by the ferrule heads in the concrete of water-retaining structures shall be filled with an approved non-shrink grout applied strictly in accordance with the manufacturer's specifications".

PSG 5.4 PIPES AND CONDUITS

ADD THE FOLLOWING:

"All pipes passing through to concrete floors, walls or slabs shall be cast into a concrete member simultaneously with the casting of the member. Openings for pipes shall only be left in concrete

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members when so directed by the Employer's Agent or when shown on the drawings. Pipes shall be installed in such openings according to the details shown on the drawings.

If water tightness is a requirement where pipes are cast into walls, floors and slabs, the Contractor shall ensure water tightness where smooth-surfaced pipes are used by using an approved method such as tape wrapping the pipes prior to casting in. The cost of such method will be deemed to be included in the rates tendered for item PSG 8.10".

PSG 5.5 CONCRETE

PSG 5.5.1 Quality

PSG 5.5.1.5 Durability

The exposure conditions of the concrete are classified as "severe".

PSG 5.5.1.7 Strength concrete

ADD THE FOLLOWING:

"The concrete mixes for sulphate resistant cement shall be designed by an approved laboratory for approval by the Employer's Agent before commencement of any concrete work".

PSG 5.5.3 Mixing

PSG 5.5.3.2 Ready-mixed concrete

ADD THE FOLLOWING:

"Ready-mixed concrete may be used on the Site. The contractor shall take samples for testing from every load delivered to the Site".

PSG 5.5 5 Placing

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.5.5.10 "Concreting of the wall between horizontal construction joints shall be carried out in both directions from a point on the wall in order to close the gap with fresh concrete".

PSG 5.5.7 Construction joints

ADD THE FOLLOWING:

"Horizontal construction joints are permitted in structure walls in positions indicated on the drawings or approved by the Employer's Agent. Vertical construction joints in the wall are subject to the written approval of the Employer's Agent and the cost of all such vertical or horizontal construction joints will be deemed to be included in the rates for cast-in-situ concrete. This also applies to the preparation of concrete to form construction joints in the flume walls as specified on the drawings.

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Witness:		Witness:	



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The construction joints in water-retaining structure shall be made strictly in accordance with the details shown on the drawings. The joints between screeds and concrete floors shall be regarded as construction joints and the surface of the floor shall be prepared as described for construction joints.

Should the Contractor's method of construction necessitate the placing of construction or other joint in a position not shown on the drawings, such method of construction and position of the joint shall be approved by the Employer's Agent in writing. The cost of such joint shall be included in the tendered rates and shall include scrubbling of the concrete where steel reinforcement is continuous.

The walls shall be cast in lifts of height that permits each lift to be poured without interruption in one continuous operation during working hours.

It is the Contractor's responsibility to ensure that construction joints are watertight. The Contractor's proposed method for ensuring the watertightness of such joints shall be submitted to the Employer's Agent for his approval.

For construction joints at kickers all additional costs for concrete, preparation, etc will be deemed to be included in the rates tendered for concrete in walls or sides and kicker joints or construction joints will not be measured separately".

PSG 5.5.8 Curing and protection

ADD THE FOLLOWING:

"Curing by retaining the formwork in place or by covering with a waterproof membrane are the curing methods strongly recommended. Concrete will not be paid for unless properly cured and proof of curing is continuously visible on the Site".

PSG 5.5.11 Watertight concrete

ADD THE FOLLOWING:

"The minimum cement content in water-retaining structures shall be 325 kg/m³, and the maximum cement content shall be 450 kg/m³ in reinforced concrete".

The maximum water cement ratio for water-retaining structures shall be more 0, 50".

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.5.16 Soilcrete

Where soilcrete is specified for filling under floor slabs the soilcrete shall comply with the requirements of subclause PSDB 3.5 (d) of section 1200 DP as amended and shall be placed as specified in this subclause.

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Witness:		Witness:	



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PSG 6 TOLERANCES

PSG 6.2 PERMISSIBLE DEVIATIONS

PSG 6.2.3 Specified permissible deviations

ADD THE FOLLOWING:

“Degree of accuracy II is applicable.

Every specified permissible deviation is binding in itself. The cumulative effect of permissible deviations will not be considered. The maximum permissible vertical deviation is subject to the other permissible deviations”.

REPLACE SUBCLAUSE 6.2.3 (D)(5) WITH THE FOLLOWING:

	Permissible deviation		
	Degree of accuracy		
	III	II	I
	mm	mm	mm
“Vertically, per metre of height	5	3	2
Subject to a maximum	50	30	10

PSG 7 TESTS

PSG 7.1 FACILITIES & FREQUENCY OF SAMPLING

PSG 7.1.1. Facilities

ADD THE FOLLOWING:

“The Contractor shall provide sufficient storage capacity for the concrete cubes and shall arrange to have them tested by an approved laboratory.

The cost all testing, including the cost of sampling, storage and transporting samples should be included in the rates tendered for concrete work”.

PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE

ADD THE FOLLOWING:

“Test results obtained from the supplier of ready-mix concrete will not be accepted for evaluation in terms of subclause 7.3, but samples for testing shall be taken off such concrete at the point of placing “.

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Witness:		Witness:	



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ADD THE FOLLOWING SUBCLAUSE:

PSG 7.3.6 Testing for watertightness

Water for testing shall be provided by the Contractor and shall be responsible for providing all necessary equipment that may be required for filling the structures.

The structure shall be filled with water at a uniform rate not exceeding 2.0 m in 24 hours until the top water level been reached. The water level will then be carefully noted and recorded by the Employer's Agent in relation to a fixed benchmark, and shall be contained by the addition of further water for a sterilising period to permit complete absorption of water by the concrete.

The sterilising period may be 7 days for a maximum design crack width of 0.1mm or 21 days for 0.2mm or larger. After the sterilising period, the level of the liquid surface shall be recorded at 24-hour intervals for a test period of 7 days. During the 7 day test period the total permissible drop in level, after allowing for evaporation shall not exceed 1/500 the one of the average water depth of the full tank, or 10 mm.

The evaporation shall be measured by the mean drop in level caused by the evaporation of the water in three flat containers floating in the water being recorded.

In the event of appreciable leakage being evident at any of the stages of the filling or testing or the event of the Employer's Agent considering the final degree of water tightness to be unsatisfactory, the contractor when ordered by the Employer's Agent shall discontinue such filling or testing and shall, at his own expense, take approved steps immediately to rectify the leakage, until a satisfactory test is obtained, which shall prove to the Employer's Agent that a sufficient degree of watertightness has been obtained.

The cost of emptying a water-retaining structure which cannot be drained shall be borne by the Contractor. The water shall be discharged in a manner approved by the Employer's Agent and shall be such that the employer can utilise the water is he so desires.

The water shall not be used as a medium for additive's to affect remedial work or to stop leaks.

The cost of retesting the structure for watertightness shall be borne by the Contractor".

PSG 8 MEASUREMENT AND PAYMENT

PSG 8.1 MEASUREMENT AND RATES

PSG 8.1.1 Formwork

DELETE "or splays over 20 mm x 20 mm" FROM THE FIRST LINE OF PARAGRAPH 8.1.1.2

ADD THE FOLLOWING PARAGRAPH 8.1.1.2

"Splays up to and including 25 mm x 25 mm will not be measured separately and will be deemed to be included in the formwork costs".

ADD THE FOLLOWING PARAGRAPHS

"8.1.1.7 For construction joints at kickers (joint F), all additional costs for formwork to edges up to 300 mm high will be deemed to be included

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in the rates tendered for vertical formwork to sides of walls and will not be measured separately in narrow width.

- 8.1.1.8.1 No formwork will be measured to edges of blinding layers under structures and the cost thereof (if needed), will be deemed to be included in the rates tendered for concrete in blinding layers.
- 8.1.1.8.2 Back-shuttering or formwork to top revealed surfaces of sloping - or conical formwork will only be measured to surfaces over 40° and 85° to the horizontal.
- 8.1.1.8.3 Formwork to horizontal surfaces in pump stations, valve chambers, man holes or sumps can either be removed through the manhole cover opening or the Contractor may use permanent formwork at his own cost as no claims in this regard will be considered".

PSG 8.1.2 Reinforcement

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"The unit of measurement for steel bars shall be the ton of reinforcement in place, in accordance with the Drawings or as authorised by the Employer's Agent.

The unit of measurement for welded steel fabric shall be the kilogram of fabric reinforcement in place, and the quantity shall be calculated from the net area covered by mesh, excluding overlaps.

Clips, ties, separators, stools and other steel used for positioning reinforcement will not be measured, unless these are shown on the bending schedules.

The tendered rate shall include full compensation for the supply, delivery, cutting, bending, welding, placing and fixing of the steel reinforcement, including all tying wire, stools, supports and waste".

PSG 8.1.3 Concrete

Delete "or the plank size of the excavation where additional excavation is provided to facilitate erection of forms" from the second line of paragraph 8.1.3.1(c).

ADD THE FOLLOWING:

PSG 8.2.2 Smooth

Construction of paving using clay bricks, Class 35 pavers to be used.....
Unit: m²

PSG 8.2.3 Special off form

The surfaces to be formed, cutting units to fit edge restraint
.....Unit:
m²

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PSG 8.9 Testing for watertightness

The lump sum figure will cover all the required processes to be carried out in accordance with the information and specifications referred to in clause PSG 5.5.11.3.

The tendered lump sum shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSG 8.10 Cleansing and disinfection

The lump sum figure will cover all the required processes to be carried out in accordance with the information and specifications referred to in clause PSG 5.5.11.4.

The tendered lump sum shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSG 8.11 Slip joints

Measurement shall be for the total area of 500um DPC placed in 2 layers underneath the reservoir wall-footings to form the slip joint as detailed on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSG 8.12 Thermo insulation

Measurement shall be for the entire area of roofing to be covered with a 100mm thick layer of well-graded, thoroughly cleaned, 19mm concrete aggregate placed as shown and detailed on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSG 8.13 Drain pipes

Measurement shall be per linear metre of drainpipe required as indicated in the bill of quantities and on the drawing. The protective geotextile for these pipes is to be measured and included with this item.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified and must include the pipe and associated protective geotextiles.

PSG 8.14 Geofabric layer

Measurement shall be for the total area of geotextile as specified in the bill of quantities and on the drawings, placed between the no-fines concrete drainage layer and the 30mm thick blinding layer.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

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PSG 8.15 Manholes

Measurement shall be for the complete number of manholes required as specified on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSG 8.16 Bearing strip

Measurement shall be per linear metre of bearing strip required to be placed between the reservoir wall and roof as specified on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSG 8.17 Roof weepholes

Measurement shall be for the number of weepholes required as per the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSG 8.18 Brickwork

PSG 8.18.1 Brick Walls

The bricks shall be clay face bricks to SABS 227, class FBX. The bond shall be English or Stretcher bond.

The bricks shall be placed in class 1 mortar. All jointing shall be square pointed by recessing the mortar a minimum of 5 mm. All brickwork shall be cleaned of any excess mortar by wire brush and acid wash cleaning as required.

PSG 8.18.2 Brick Reinforcement

Brick reinforcement shall be installed every third brick layer.

PSG 8.18.3 Lintels

Lintels to be prestressed concrete manufactured to SANS 1504 – 1990.

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PSHA STRUCTURAL STEELWORK (SUNDRY ITEMS)

ADD THE FOLLOWING:

PSHA 8.1 Manhole cover

Measurement shall be for the required number of manhole cover and frame assembly's as specified on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSHA 8.2 Roof ventilators

Measurement shall be for the required number of hot-dipped galvanized roof ventilators as specified on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSHA 8.3 Internal Ladder

Measurement shall be for the required number of internal ladders as specified on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

PSHA 8.4 External Ladder

Measurement shall be for the required number of external ladders as specified on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required in order to complete the work as specified.

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PSL MEDIUM-PRESSURE PIPELINES

PSL 2 INTERPRETATIONS

PSL 2.4 ABREVIATIONS

ADD THE FOLLOWING:

HDPE : High density polyethylene

mPVC : Modified Polyvinyl chloride

PSL 3 MATERIALS

PSL 3.1 GENERAL

ADD THE FOLLOWING TO CLAUSE:

The contract specifications for materials and construction activities will conform to SANS 1200, SANS 1914-5 and Johannesburg Water requirements. The project specifications will include specific items to ensure proper implementation, control reporting on labour based construction and methods as included in the specifications.

Materials for this contract should preferably be obtained from manufacturers who operate an effective quality management system such as that described in SANS 0157 or ISO 9000.

PSL 3.4 STEEL PIPES, FITTINGS, AND SPECIALS

PSL 3.4.3 Pipes of nominal bore over 150mm

OMIT PARAGRAPH (C) AND INSERT THE FOLLOWING:

"Steel pipes and fittings shall be manufactured in accordance with API 5L X42 (yield strength of 289MPa). The wall thickness of the pipes and fittings shall be 6 mm. All pipes and specials shall be supplied complete with flanges as specified to SANS 1123.

Pipes and fitting to be externally coated with a Rigid Polyurethane Coating (RPU) and lined internally with solvent-free epoxy (SFE) lining or similar approved. The Target Thickness of lining shall be 600 microns (minimum 500 microns and maximum thickness 800 microns) to SANS 1217. E128 external corrosion protection at joints.

Cathodic protection design will be done by a specialist and will be procured separately and construction will be as directed by the specialist.

The pipe manufacturer shall submit to the Employer's Agent the steel maker's certificates covering all steel used. These certificates shall indicate the process of manufacture, the chemical analysis and the physical properties of the steel except that, at the option of the pipe manufacturer, the physical properties of the steel may be determined from specimens taken from finished pipe. The pipe manufacturer shall also provide X-rays and welding approval certificates for all circumferential welds, including welding for flanges"

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PSL 3.7 OTHER TYPES OF PIPES

PSL 3.7.1 uPVC Pipes

ADD THE FOLLOWING TO THE SUB CLAUSE

"Class 16 uPVC Pipe systems shall conform to SANS 966-1998 Part1 or II as applicable and have integral pipe end sockets of the rubber ring joint type. All uPVC - pipes shall be in 6m lengths. Fittings and specials for uPVC pipes shall be manufactured in Grade 14 cast iron, rated to at least 1600kPa working pressure. Unless otherwise specified fittings and specials shall be bitumen dipped.

PSL 3.7.2 Polyethylene Pipes

REPLACE THE SUBCLASE WITH THE FOLLOWING

"HDPE pipes of diameter up to and including 63 mm shall conform with SANS 4427 Part 2 for Type IV pipes. HDPE pipes greater than 63 mm shall conform with SANS 4427 Part 3 for Type V pipes. Unless otherwise specified, pipes shall be Class 16 and plain ended for butt welding".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.7.3 uPVC Pipes

Class 16 uPVC high impact pipes shall conform to SANS 1283 (alternatively ISO 4422) shall be used unless otherwise indicated. Jointing shall be effected by means of approved "press-on" shouldered ends and cast iron and steel Victaulic clamps. Unless otherwise specified, pipes shall be Class 16.

Where the cutting of any pipe is necessary, shouldered ends shall be fixed to the pipe by means of an approved machine capable of clamping the pipe without causing any damage to the pipe and pressing on the shouldered end by means of a hydraulic operated jack applying a uniform axial force to locate the shouldered end truly in position. The use of impact force to either the pipe or shouldered end will not be permitted. No on-site fixing of shouldered ends shall be permitted."

ADD THE FOLLOWING NEW SUBCLAUSES:

PSL 3.7.4 mPVC Pipes

High impact mPVC Class 16 and shall conform to SANS 1283 for diameter up to and including 315mm with a fully end load restraint coupling system approved by Johannesburg Water.

PSL 3.7.5 Concrete Pipes

Concrete pipes will be Class 100D with spigot and socket joints to SANS 677.

PSL 3.8 JOINTING MATERIAL

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.2 Flexible couplings

OMIT THE EXISTING CLAUSE AND INSERT THE FOLLOWING:

"All flexible couplings shall be "Viking Johnson" couplings without centre register, or approved similar.

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Rubber rings shall be of the wedge-type and shall be manufactured from natural or synthetic rubber only. Reclaimed rubber shall not be used in the manufacture of the rubber rings".

PSL 3.8.3 Flanges and accessories

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"The dimensions and drilling of standard flanges shall comply with the requirements of SANS 1123 and SANS 1476 for a working pressure as specified. Flanges shall be machined flat, i.e. without a raised joint face. Puddle flanges shall have the same dimensions as standard flanges but shall be undrilled. Flanges to be drilled according to the relevant tables as specified.

Faces of flanges which will be in contact with jointing gaskets shall receive a protective coating of such thickness and consistence as will not impair the air/gas/water tightness of the joint".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.8 Victaulic joints

Joints for uPVC and medium steel pipelines shall conform to SANS 815: Standard specifications for shouldered end pipes, fittings and couplings.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.9 HDPE Pipe joints

Joints for HDPE pipe shall be by means of welding, welded flanges or approved external compression type fittings".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.9 CORROSION PROTECTION

PSL 3.9.2 Steel pipe

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"All coating and linings, shall be completed strictly to the publication "Corrosion Protection for Civil, Mechanical and Electrical Engineer 2000 Edition.

Pipes and fitting shall be externally coated with a Rigid Polyurethane Coating and internally lined with a Solvent Free Liquid Epoxy lining as per Section X in Portion C of this Document.

PSL 3.9.2.3 Repairs to epoxy coatings

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

PSL 3.9.2.3.1 General

- (a) Where the damage is extensive the remedial procedures shall be agreed in writing with the Employer's Agent.
- (b) All repairs shall comply with the requirements of the repair-product manufacturer's data sheet. The Employer's Agent may at his discretion request that repaired coating areas undergo adhesion tests.

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- (c) The Contractor shall repair any damage occurring during transport, on site during handling, assembly, storage, and erection.
- (d) The repaired area shall be tested in accordance with Sub-Clauses 8.4 and 8.12 of SANS 1217 for compliance with the relevant requirements for thickness and electrical insulation defects respectively.
- (e) Any item showing electrical insulation defects exceeding an average of five per square metre (a cluster of pinholes within a radius of 25 mm being regarded as a single defective area), or flaking or other signs of loss of adhesion, shall not be repaired. The item shall be blast cleaned and re-coated in accordance with the relevant requirements of the Clause PSL 3.9.2.3.3.

PSL 3.9.2.3.2 Repair Methods for Minor Defects

The repair of areas showing electrical insulation defects or low film thickness shall, if approved by the Employer's Agent, be carried out as follows:

- (a) Degrease in accordance with Clause PSL 3.9.2.3.4.
- (b) Thoroughly abrade the damaged area, including an adjacent surrounding area of at least 25 mm wide, with a medium grade 220 abrasive paper;
- (c) Vacuum-clean the surface to remove dust and debris in accordance with SANS 5769.
- (d) Wipe the abraded paint surface with methyl ethyl ketone and allow to dry, and
- (e) Apply as many coats of the following repair material as necessary to achieve the specified thickness and finish.
 - (i) Solvent free epoxy; or
 - (ii) Fusion-bonded epoxy powder repair kit.

NOTE: Apply a final topcoat over the repaired area to achieve a pleasing, uniform finish of the item.

PSL 3.9.2.3.3 Repair Methods for Major Defects

The total un-coated areas for renovation by the applicator shall not exceed 0.5% of the total surface area of a component. Each un-coated area for renovation shall not exceed 2 500 mm². If damaged areas are larger, the items containing such areas shall be re-coated.

The repair of areas showing damage down to the steel surface shall, if approved by the Employer's Agent, be carried out as follows:

- (a) Degrease in accordance with Clause PSL 3.9.2.3.4
- (b) Blast-clean all damaged areas to Sa 3 (ISO 8501-1).
- (c) Feather the surrounding paint for a distance of 25 mm beyond the damaged areas with a medium grade 220 abrasive paper.

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- (d) Vacuum-clean the surface to remove dust and debris in accordance with SANS 5769.
- (e) Wipe only the abraded paint surface with methyl ethyl ketone and allow drying.
- (f) Apply as many coats of the following repair material as necessary to achieve the specified thickness and finish.
 - (i) Solvent free epoxy or
 - (ii) Fusion-bonded epoxy powder repair kit.

NOTE: Apply a final topcoat over the repaired area to achieve a pleasing, uniform finish of the item.

PSL 3.9.2.3.4 Degreasing

- (a) All surfaces to be coated shall be tested for oil and grease contamination by the water break free test.
- (b) Oil and grease contamination shall be removed by:
 - Steam-cleaning;
 - An emulsifiable or aqueous detergent applied in accordance with SANS 1344; and
 - An alkaline cleaning solution.
- (b) Allow to react, and then rinse off with clean, potable water to remove all residues prior to surface preparation, all in accordance with Clauses 3.3 and 3.4 of SANS 10064.
- (c) The surfaces shall be tested after degreasing and show no oil, grease and chemical contamination after degreasing.
- (d) Care shall be taken to avoid entrapment of cleaning agents in recesses or other retention areas.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.9.2.4 REPAIR OF DAMAGED SINTAKOTE

PSL 3.9.2.4.1 General

Damaged Sintakote shall be repaired in accordance with the procedures detailed in the Tyco Handling and Installation Manual for steel pipeline systems for the repair of Sintakote or in accordance with clause 3.2 or clause 3.3

Employer:		Contractor:	
Witness:		Witness:	



PSL 3.9.2.4.2 REPAIR OF SMALL PINHOLE TYPE DEFECTS

PSL 3.9.2.4.2.1 Surface Preparation

- Clean and dry the area to be repaired including the removal of dirt, dust and other contaminants. Slightly roughen the area around the repair for a minimum distance of 50 millimetres using a coarse file or abrasive paper.
- Wipe the surface with a clean dry rag.

PSL 3.9.2.4.2.2 Priming

- Stir the primer to ensure complete mixing prior to application. Apply a thin even coat of Primer around the area of repair using a paint brush or roller.
- Allow the primer to tack dry (approximately 10 to 20 minutes).

PSL 3.9.2.4.2.3 Tape Wrapping

- Apply approved tape to the repair area ensuring a minimum of 50 mm overlap onto sound coating around the defect area.
- Apply approved P.V.C self-adhesive over wrap tape around the full pipe circumference to completely cover the repaired patch.

PSL 3.9.2.4.3 REPAIR OF LARGE AREA OF DAMAGE WHERE STEEL IS EXPOSED

PSL 3.9.2.4.3.1 Surface preparation

Cut out the area of Sinkakote and clean the steel surface in accordance with AS1627.2.Clean and dry the area to be repaired .Slightly roughen the area around the repaired using a course file or abrasive paper. Wipe the surface clean with a dry clean rag.

PSL 3.9.2.4.3.2 Priming

- Stir the primer to ensure complete mixing prior to application. Apply a thin, even coat of approved Primer onto the steel surface and around the periphery of the Sintakote.
- Allow the primer to track dry (Approximately 10 to 20 minutes).

PSL 3.9.2.4.3.3 Filling/Priming

- Cut out a piece of Bitumen Mastic Strip to fit into the bare steel area prior to applying the primer.
- Insert the cut out piece of Bitumen Mastic Strip into the repair area.
- Re-apply a thin even coat of Densopol Primer D over the patch and adjacent area of Sintakote.
- Allow the primer to track dry(Approximately 10 to 20 minutes).

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**PSL 3.9.2.4.3.4 Tape Wrapping**

- Apply approved tape to the repair area ensuring a 50mm overlap over the fitted patch.
- Apply approved P.V.C self-adhesive over wrap tape around the full pipe circumference to completely cover the repaired patch.

PSL 3.9.2.4.4 SURFACE PREPARATION

All joints shall be fully welded and sealed and all sharp edges and corners ground off to a radius of not less than 1.5 mm. All weld spatter and irregularities shall be removed. Any unsound or damaged edges of sintakote shall be cut back into the sound coating and the edges chamfered.

The surface shall be cleaned by means of power tools to achieve a minimum surface preparation in accordance with AS1627.2 TO CLASS St. 2. All dust, dirt, moisture and grease shall be removed. Slightly roughen the Sintakote 100 millimetres both sides of the joint, using a coarse file or abrasive paper. Wipe the surface clean with a dry rag.

PSL 3.9.2.4.5 PRIMING

- Stir the primer to ensure complete mixing prior to application, Apply a thin even coat of approved Primer to the steel and roughened sintakote surfaces using a paintbrush or roller.
- Allow the primer to touch dry (approximately 10 to 20 minutes).

PSL 3.9.2.4.6 MASTIC FILLING

To improve the contours for wrapping the tape, fillet welds, sharp edges of sintakote, test plugs or welding lid holes shall be filled and profiled with Bitumen Mastic Strip. The mastic filling shall be molded such that the tape can be applied with no sharp edges protruding or air entrapment.

PSL 3.9.2.4.7 TAPE WRAPPING

Commencing at least 100 millilitres back onto the primed sintakote one complete turn of 150 millilitre wide approved tapes shall be applied. Release film shall be removed before application. While holding the tape under tension, the pipe shall be spirally wrapped using a 55 percent overlap and finished 100 mm onto the primed sintakote with one complete circumferential wrap around the pipe. The tape shall be cut off in the downward direction of wrapping. New roles of tape shall have the ends overlapped at least 75 mm.

During wrapping the tape shall be smoothed out by hand to exclude any air bubbles or wrinkles and to seal overlaps.

Care shall be taken to prevent any folds or misplacement of the tape, especially under the pipe, and to prevent the tape becoming contaminated during wrapping.

The butt-welds in segmental (lobster bends) are to have the tape applied partial layer by partial layer with a 55 percent overlap until a full spiral wrap can be made (refer sketch in appendix A) continue wrapping onto the primed sintakote for at least 100mm with one complete circumferential wrap around the pipe.

Straight steel pipes shall also be wrapped with approved tape with a 55 percent overlap in accordance with the above clauses.

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**PSL 3.9.2.4.8 STEEL FITTINGS AND FLANGES****PSL 3.9.2.4.8.1 GENERAL**

Procedures for the protection of steel fittings applies to both main pipeline fittings and branch pipe work. Fittings manufactured and coated by Tyco shall be factory coated with Sintakote. Difficult fittings such as valves may be protected using a more conformable petrolatum system in accordance with TS29 only with the approval of an SA Water representative.

PSL 3.9.2.4.8.2 SURFACE PREPARATION

Still surfaces shall be prepared in accordance with clause 4.1.

PSL 3.9.2.4.8.3 TAPE WRAPPING

Prepare and wrap all straight sections leading up to the fitting and flange in accordance with section 4.

PSL 3.9.2.4.8.4 PRIMING

- Stir the primer to ensure complete mixing prior to application. Apply a thin even coat of approved Primer to the prepared steel surfaces and a minimum of 50mm onto the wrapped areas using a paint brush.
- Allow the primer to touch dry (approximately 10 to 20 minutes).

PSL 3.9.2.4.8.5 MASTIC WRAPPING

Unavoidable sharp edges such as bolts, nuts and collars shall have mastic strip moulded over the positions or edges. Strip with a 55 percent overlap onto itself and minimum 50mm overlap onto the tape or Sintatoke coated pipe work. Press the Bitumen Mastic Strip firmly into place ensuring no air voids are beneath the Bitumen Mastic Strip.

Note: The Bitumen Mastic Strip provides corrosion protection to the steel work and is similar in composition to other tape, but it does not have a woven carrier.

PSL 3.9.2.8.6 OVER WRAPPING

150 or 100mm wide MP/HD tape (self-adhesive PVC) shall be spirally wrapped over the Bitumen Mastic Strip with a 55percent overlap. While wrapping, the Denso MP/HD tape shall be pulled firmly and the lapse properly sealed.

PSL 3.9.2.8.7 TESTING

All repairs and wrapping shall be tested using a high voltage "spark" tester in accordance with AS3894.1 at an operating voltage of 15 KV.

PSL 3.9.3 Protection against electrolytic corrosion

OMIT THE EXISTING CLAUSE AND INSERT THE FOLLOWING:

"All joints and fittings shall be fully wrapped with approved protective tapes. Protective tape shall comply with either Specification A or Specification B as ordered by the Employer's Agent.

Specification A

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This tape shall be made up of pre-bonded components to form a composite single wrap tape. The adhesive inner protective tape must provide complete protection to steel piping against electrolytic corrosion. It shall be impermeable to water, chemically inert and physically stable and must provide a perfect seal at the overlap on a spiral-winding pattern.

The adhesive outer protective tapes shall be tough and impact resistant, providing suitable protection of the inner protective tape against mechanical damage. It shall be stable and not crack or deteriorate when buried. The tapes shall be chemically resistant to all common acids and alkalis normally encountered in the soils at the construction site.

The tapes shall be suitable for both machine and hand application.

The Combination electrical characteristics of the inner and outer wrap together must exceed:

Dielectric strength = 25kV/mm

Insulation = 100hm metre

The following minimum criteria shall be satisfied:

	Inner Tape	Outer Wrap
Thickness (mm)	0,3	0,3
Tensile strength (kg/cm width)	3,3	5,0
Elongation at break (%)	200%	50%
Adhesion to primed steel (gm/cm width)	220	220

Specification B

This tape shall be made up of a non-woven synthetic fibre carrier impregnated and coated on both sides with a compound incorporating high melting point bitumen. During application the tape shall be correctly heated and laps adequately sealed all in accordance with the instructions and recommendations of the supplier.

Before the application of any protective material, the surface of the pipe shall be thoroughly cleaned and all loose or damaged pipe coating removed. All ridges, depressions and steps in the surface shall be filled with an approved filler so as to present a smooth uniform surface. After the filler has hardened, the entire surface to be wrapped shall be primed with a primer or otherwise treated as recommended by the supplier of the tape.

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The protective tape shall be applied as a spiral wrap with not less than 50% overlap.
The width of the tape shall be appropriate for the section to be wrapped".

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PSL 3.9.5 Joints, nuts, bolts and washers

DELETE AND REPLACE WITH THE FOLLOWING:

"All bolts and nuts shall comply with the requirements of the relevant sections of SANS 1700 and shall be of Grade 4.6 steel. Washers shall be provided at each nut and shall be of the same material (or coating where applicable to match the bolt and nut. Nuts and bolts subject to vibration shall be machined finished fitted with plain washers and treated with "Loctite" or equivalent.

Bolts other than jacking bolts shall project not less than 3mm and not more than 10mm from the heads of the nuts after tightening.

All bolts to be built into concrete work as well as bolts to be installed above ground level (outside buildings), directly above and under water shall all be of stainless steel grade 304. Bolts for flexible couplings and flanges for underground installation shall be hot dip galvanized. Bolts to be installed inside buildings shall be hot dip galvanized. Galvanizing shall be in accordance with the Standard Corrosion Protection Specification (Heavy coating).

Suitable plastic sleeves and/or washers shall be used for protection against corrosion by bi-metallic action".

PSL 3.9.6 Corrosive soil

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"Steel pipes, pipe fittings and steel flanges in contact with soil shall over and above the protection as described above be protected as specified in Clause 3.9.3 with "DENSO" tape and/or mastic or approved similar. Application shall be strictly in accordance with the manufacturer's instructions. A polyethylene tape of 300 microns minimum shall be spirally wrapped over the petrolatum tape and fixed to the clean pipe ends with pressure sensitive tape".

PSL4 PLANT

PSL 4.4 PACKING

ADD THE FOLLOWING NEW SUBCLAUSE:

Goods should be suitably packed in such a manner as will ensure safe and efficient transport by road or rail, and the Contractor shall include in his prices for whatever packing may be necessary in this respect. Small items particularly liable to damage or loss in transit should be crated. All crates and packing material shall, after use, become the property of the Employer unless distinctly specified otherwise, or if returnable, shall be so at the Contractor's expense. Pipes shall be supported during transport in such a manner as to prevent damage to the lining and coating.

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PSL 5 CONSTRUCTION

PSL 5.1 LAYING

PSL 5.1.1 General

(a) Delivery of Pipes

Pipes shall be off-loaded alongside and as close as possible to the trench excavated for the pipes. The Contractor shall be responsible for the supply and delivery of pipes and shall make all the arrangements necessary for the transportation of the pipes from the factory workshop to the site, as well as for the provision of special tractors and haulers to deliver the pipes at steeply sloping sections of the pipe route. The expenses for the above operations shall be included in the rates tendered for pipes.

The Contractor shall deliver pipes at the appropriate position on Site when and as requested by the Engineer. The Engineer reserves the right to order that the pipes be delivered and stacked at either the top or the bottom of a steep slope or to request that the pipes be stored at the manufacturer's workshops until needed on the Site.

(b) Off-loading of pipes

The pipes shall be protected against damage at all times and shall only be lifted with wide sling straps or flat-faced hooks. The use of chains, cables etc. shall not be permitted.

Pipes shall be supported by means of heaped loose sand or sand bags where they are stored or unloaded alongside the trench.

(c) Repair of damage and protection during transportation

The Contractor shall undertake all repairs to damaged pipes and/or pipe coatings at his own expense.

The pipes shall be protected against damage at all times during transportation. Appropriately shaped wood-blocks, at least 150 mm wide and sufficiently upholstered, shall be provided on transport vehicles as support for the pipes. The use of chains, cables etc. to secure or lift pipes shall not be permitted. If the Contractor is of the opinion that the ends of the pipes should be protected, suggestions to this effect are to be submitted with the Tender. Expenses with regard to such protection shall be considered to be included in the tendered rates for pipes.

(d) Pipe-laying Personnel

The laying of pipes and ancillary fittings shall be performed only by a qualified person who is registered by the local authority as an artisan in the plumbing, pipe fitting, or drain laying trades or who is qualified by reason of having attended and passed a course on pipe laying. Proof of competence will be required prior to commencement of the works.

(e) Pipe-laying

All equipment is to be approved by the Engineer. Equipment shall be of such design that it will not damage or disturb pipes, pipe coatings and/or existing pipelines.

Before a pipe is laid it shall be visually examined for damage. No pipe shall be laid without the permission of the Engineer.

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Any manufacturing defects shall be reported to the Engineer without delay and the Contractor shall simultaneously make arrangements for its repair.

Any damage done to the coating during transportation, unloading or storing of pipes, shall be repaired by the Contractor.

Before any pipe is placed, the bottom of the trench shall be examined to ensure that the coating of the pipe will not be damaged in any way possible when the pipe is placed in position and that the pipe supported evenly and uniformly throughout its entire length.

Any damage arising during or after laying of pipes shall be repaired by the Contractor and the Engineer may request that the pipe be removed from the trench to this purpose.

Before pipes are placed, the bedding of the trench shall be examined with regard to compaction, alignment and grade, for each pipe length between the survey pegs and manholes. Permission to lay pipes shall be obtained from the Engineer. The pipes shall subsequently be placed in position and joints made as specified in this Section.

Accessories shall be installed where indicated or where instructed by the Engineer.

(f) Cleaning of pipeline

As the pipes are laid, they shall be cleaned on the inside by brushing and removal of all loose material.

(g) Jointing of pipes

After the pipes have been placed in position, they shall be accurately aligned to ensure that the gaps between the different pipe lengths are uniform.

(i) Change of direction (bends, specials)

Each change of direction shall be made by, either cutting a single segment from the pipe, using a special, or deflecting a flexible coupling according to the manufacturer's instructions and as approved by the Engineer. All work involved in the manufacture of a special shall be done in the manufacturer's workshop and delivered complete at the Site, alongside the pipe route.

The manufacture, testing and coating of specials and repair of damaged parts shall be carried out in compliance with specifications.

(k) Casing of pipes

Where pipes must pass through or be encased in concrete, they shall be placed and secured in the precise positions indicated on the Drawings and the shuttering shall be placed around the pipe and secured. The concrete shall subsequently be thoroughly compacted around the pipes to form a watertight joint.

The Contractor shall be responsible for grouting, compacting and waterproofing around all pipes and accessories passing through the walls and/or floors of structures, whether the Contractor himself or another contractor supplies and installs the pipes and accessories.

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PSL 5.1.4 Depth and Cover

PSL 5.1.4.2 Cover

ADD THE FOLLOWING TO THIS SUBCLAUSE:

"The minimum cover to finished surface over water mains shall be at least 1000 mm in trafficked areas and at least 800 mm elsewhere. At valves the depth of the pipeline shall be increased if necessary to ensure a minimum cover of 100mm over the valve cap. The cover shall be maintained as close as possible to the minimum without local sags or humps and shall not be increased above the minimum by more than 200mm without the approval of the Employer's Agent".

PSL 5.1.4.3 Crossing Existing Services

IN ADDITION TO THE EXISTING CLAUSE THE FOLLOWING SHALL APPLY:

- a) Except as allowed in b) below, water mains shall be so laid in road verges, that the minimum cover from the finished surface level to the top of the pipe barrel is 1000mm. Under carriageways, water mains shall be laid so that the minimum cover is 800 mm.
- b) The Contractor may increase the cover by a maximum of 200mm. However, except as allowed in a) above, no decrease in cover will be permitted.
- c) Where water mains cross existing piped services, the minimum clear distance between the outsides of the pipe barrels shall be 150mm.

PSL 5.2 JOINTING METHODS

PSL 5.2.2 Flanges (Steel Pipelines)

ADD THE FOLLOWING TO THIS SUBCLAUSE:

Before being brought together, the ends of the pipes, fittings, couplings and all flanges are to be inspected and cleaned and ensure that all parts forming the joint are undamaged and clean.

In jointing flanges for valves etc, the faces of the flange shall be cleaned thoroughly and the jointing material, 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 at least two-thirds of all bolts inserted in the bolts holes and evenly distributed over the circumference of the flange. After the fittings have thus been aligned and well supported, the joint shall then be closed by bolting up all bolts to uniform tightness. On completion of the joint, the flanges and bolts shall be painted with one coat of bituminous paint which shall be supplied by the Contractor. An approved rubber-based adhesive shall be used for holding rubber insertions in position while flanges are being brought together.

PSL 5.2.3 Welding

ADD THE FOLLOWING TO THIS SUBCLAUSE:

The Engineer shall have the right to carry out Qualification Tests for each welder employed on the works. No welder shall be employed who fails to pass such test.

Site-welded joints are to be tested by radiographic examination or other approved method as ordered by the Engineer who will also make the necessary arrangements for such tests to be carried out. Holiday detection tests shall be carried out in the field to ensure continuity to lining and wrapping.

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After jointing and testing, the protective lining and wrappings are to be rendered continuous with the same materials as applied to the body of the pipe.

In the event of any welded joint proving in any way unsatisfactory when the pipeline is subjected to the radiographic or hydraulic tests, the Contractor shall be held entirely 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 Engineer, and thereafter restoring the lining and wrapping, if these have become damaged, all to the satisfaction of the Engineer.

The tendered prices for supply, delivery, laying, jointing and testing of pipes are to be including for all the work described above and for the supply of all necessary materials, welding electrodes, welding plant, etc.

a) General

“Field welding of pipes which have been lined will be permitted only for pipes of DN600 and larger where a man is able to enter the pipe to make good the lining after welding and testing in accordance with Clause 7.2 of SANS 1200L has been completed. Pipes of lesser diameter may be field welded where concrete linings will be made after the pipeline has been laid and all welds have been tested and approved.

At the discretion of the Employer's Agent, roll welding will be permitted, provided pipe alignment is maintained by use of skids or of structural framework to accommodate two or more lengths of pipe with an adequate number of roller dollies to prevent sag in the pipe. The entire root bead, however, shall be made with the pipe in a stationary position.

All pipes welded in the trench shall be properly laid and aligned before welding commences. Bell holes shall be excavated at all field welds. The Contractor shall not lift the pipe to provide adequate access for the welders to enable them to stovepipe weld the joint.

The alignment of abutting ends shall be such that the offset will not exceed 1.7 mm. Line up clamps shall be used for joint “fit-ups”. The use of “bridges and wedges” or any method that may induce unnecessary stresses is forbidden.

Both ends of coated and lined pipes shall be wrapped for a distance of at least 800 mm on either side of the weld by means of an asbestos mat or other approved material to ensure that weld spatter or other damage is not caused to the coating and lining during the welding process. The pipe trench shall be kept free of all dirt and water in the vicinity of the weld until after all corrosion protection measures have been completed and approved. “

b) Welding procedure and qualification of welders

Welding shall be done by only qualified welders who satisfy the requirements of API 1104, Clause 3.0. Before any welding of pipeline materials commences, the qualification of welders shall have been approved, all detailed welding procedure specifications with weld diagrams required for their completion shall have been submitted for approval in a neat form and the welding procedure qualification tests shall have been successfully concluded all in accordance with the relevant standard specifications. Each welder shall mark the pipe adjacent to the weld with the figure assigned to him.

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Sufficient records shall be kept by the Contractor to ensure that all field welds can be subsequently identified with the welder concerned.

As far as practicable all out of trench welding shall preferably be done by an automatic submerged process and the Contractor shall provide all necessary plant to carry out this process. MSEAP welding may be used where in-trench welding is done.

Heat treatment for welding shall be in accordance with API 1104 if required by same and the Contractor shall provide an approved shield to protect the pipe joint from wind and weather during heat treatment and welding.

c) Line up

Pipes shall be lined up in such a manner as to prevent damage thereto. If the pipe to be used has a longitudinal seam, these seams shall be staggered by not less than twenty degrees and welded sections, or single lengths, shall be assembled in such a manner that this seam shall remain in the top quadrant of the pipe during coating operations and after lowering into the trench.

d) Cleaning of pipe ends

Before welding, all foreign matter shall be removed from the bevelled ends. If any of the ends of the pipe joints are damaged to the extent that satisfactory welding contact cannot be obtained, the damaged pipe ends shall be cut and bevelled with an approved bevelling machine. These field bevels of pipe ends shall be made to the satisfaction of the Employer's Agent. Should laminations, split ends, or other defects in the pipe be discovered, the joints of pipes containing such defects shall be cropped, repaired, or removed from the line as designated by the Employer's Agent.

e) Inclement Weather

No welding shall be carried out during rain or high wind unless the welder and joint are adequately protected and sheltered, to ensure that the welding is not impaired.

f) Protection of coatings and linings

Before welding commences, a suitable apron at least 800 mm wide shall be wrapped around both sides of the area to be welded to ensure that weld spatter does not damage the coating and lining.

g) Butt-welding

Pipes and specials to be joined by field welding shall be supplied with ends bevelled for welding. All welding of joints shall comply with API 1104 and only approved type welding rods shall be used. If backing rings are permitted, they shall be placed in position and wedged up or adjusted so that the pipe ends are completely circular and properly mated. The space between abutting pipe ends, when aligned for welding, shall be such as to ensure complete penetration without burn-through. For pipes having the same dimensions, the spacing shall be approximately 1.5 mm. The alignment of the abutting pipe ends shall be such as to minimize the offset between pipe surfaces. For pipes of the same nominal wall thickness, the offset shall not exceed 1.5 mm. Internal line-up clamps shall be used wherever practicable and

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may be removed after the root bead is 50% completed, provided that the completed part of the root bead is in segments of approximately equal lengths, spaced about the circumference of the pipe. If conditions make it difficult to prevent movement of the pipe, or if the weld will be unduly stressed, the root bead shall be completed before releasing clamp tension.

External line-up clamps shall be used where it is impracticable to use internal line-up clamps. Partial root beads made when using external clamps shall be uniformly spaced about the circumference of the pipe, and shall have an accumulative length of not less than 50% of the pipe circumference before the clamps are removed.

Tack welding shall be carried out to maintain the root gap and position of the pipe ends during the welding proper. The number of tack-welds shall be kept to a minimum but shall not be less than four around the circumference of the pipe.

After proper preparation and tack welding, the root bead shall be carried out followed by successive filler passes, and capper pass in accordance with the approved welding procedure.

The filler and finish beads shall be deposited by an acceptable method and each filler bead shall be approximately 3 mm in thickness. Completed welds shall have a reinforcing of not less than 0.8 mm and not more than 1.5 mm above the pipe surface around the entire perimeter of the weld, and the width of the finish or cover shall be not more than 3 mm greater than the original groove. The number of beads required shall be governed by the wall thickness of the pipe, so that the completed weld will have the reinforcement previously specified; provided, however, that each weld shall consist of at least three beads. No two beads shall be started at the same point. No mitre welds will be permitted, and all welds are to be at ninety degrees ($\pm 5^\circ$) to the axis of the pipe. All slag and scale shall be removed from each bead for visual inspection immediately after each bead is run.

In all field butt-welds where it is possible to work inside the pipe, the inside weld shall be done first.

The chemical composition of weld metal and parent metal shall be similar and the inner weld metal or reinforcement shall not extend more than 1 mm above the inside metal surface of a pipe or special, and any excess shall be removed by grinding.

Defects caused by stray welding arc flashes shall be removed by grinding, provided that the pipe wall thickness is not reduced to less than the specified minimum thickness, otherwise the portion shall be cut out and repaired.

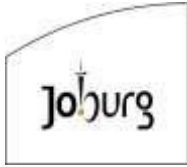
h) Fillet welding

Welding shall be as for butt-welding as applicable. All pipes of 600 mm ND and over shall be welded on both the outside and the inside.

i) Repair of welds

Rectification of defective welds shall be in accordance with API 1104 and to the satisfaction of the Employer's Agent. All costs related to the repair of defective welds shall be borne by the Contractor. Defective welds shall be repaired immediately they are found to be so. The Employer's Agent has the right to stop the Contractor proceeding with further pipe laying in the event of the Contractor delaying the

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rectification of defective welds. Furthermore, no consideration will be given to any claims arising from delays in construction resulting from such action.

All welded joints which have been repaired shall be 100% radiographed or otherwise tested to the Employer's Agent's satisfaction at the Contractor's own expense.

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PSL 5.2.5 Flexible Coupling Joints

ADD THE FOLLOWING NEW SUBCLAUSE:

Where ordered, steel flexible couplings are to be of the Viking Johnson or similar approved type, each comprising one centre collar, two special flanges, two rubbers rings and mild steel bolts.

Adaptor joints shall be of a similar design, but one end shall be flanged to enable connection of plain ended pipes to flanged specials.

The flanges are first put on, over the end of each pipe, and the rubber rings are then placed in position by stretching them over the pipes or by using special tapered plugs inserted into the ends of the pipes. The rubber rings must be free from twist and so placed that the distance from the ring to the end of the pipe is 3mm less than half the length of the centre collar. The latter shall then be placed over the end of one of the pipes and the two pipe ends brought together up to about 6mm apart. The bolts shall then be inserted into the flanges and carefully tightened up evenly on each nut in turn to ensure a watertight joint, care being taken that the gap between pipes is not thereby reduced. In the event of the central joint collar having an internal central ring or register, the pipes shall be brought together until both pipe ends are in contact with the register, after which one pipe shall then be drawn back by 6 mm.

On completion of testing and bonding, the entire joint shall be protected by covering with moulded bituminous mastic. Special moulds shall be well primed internally with thick whitewash to prevent adhesion of the mastic to the mould and shall then be clamped over the pipe and around the coupling. The bituminous mastic, suitable heated, shall then be poured into the mould so as to encase the coupling entirely. The mould shall then be stripped and cleaned for use elsewhere on the main. The tendered prices for laying and jointing are to include for the supply of bituminous mastic and the use of the necessary moulds. Alternatively "Denso Tape" protection or equal approved may be offered and full details and specification must accompany the tender.

PSL 5.2.6 Cut Pipes

ADD THE FOLLOWING NEW SUBCLAUSE:

Cut pipes may be used where permitted by the Engineer when required as closure lengths. The ends which have been cut shall be dressed square and to a smooth even finish suitable for jointing by welding or couplings which shall not be inferior to that of the uncut pipe. The finished dimensions of ends cut at site must be within the tolerances applicable to the ends of the particular type of pipes to be laid under this Contract. The cost of cutting and trimming pipes shall be included in the rates for laying and jointing of the pipes. The Contractor's priced rates for laying and jointing of pipes shall be held to include for all cutting of pipes, closures, etc.

PSL 5.8 BRICKWORK IN CHAMBERS AND MANHOLES

ADD THE FOLLOWING TO THIS SUBCLAUSE:

"The joints of exposed faces shall be flush-trowelled, hard and smooth and shall be rubbed for the full width of the joint as the work proceeds to give a hard polished finish".

ADD THE FOLLOWING NEW SUBCLAUSE

PSL 5.11 WORK ON EXISTING MAINS

Where connections are to be made to existing mains, the Contractor shall excavate back along the existing main only as far as is necessary to complete the connection satisfactorily and shall ensure that the existing mains are disturbed as little as possible. Backfilling shall be carefully placed and properly compacted beneath existing and new work to ensure that the mains, specials, etc. are properly bedded.

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Work on existing mains and components of the reticulation system shall be carefully planned in consultation with the Employer's Agent. The work shall be carried out expeditiously to ensure that the disruption of services and inconvenience to the local residents is kept to a minimum. All tie-ins shall be completed within a maximum of 10 hours.

The Contractor under strict supervision by the Employer's Agent or The Employer will do all these connections.

Hand excavation must be used to expose the existing mains and erf connections where required. While every effort has been made to ensure that the information relating to these connections is correct the Employer's Agent or The Employer takes no responsibility for the accuracy, or for the completeness of the information".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 5.12 CONNECTION TO THE EXISTING MAINS

The Contractor shall supply all necessary fittings / materials for under pressure connections suitable for all pipe sizes.

The Contractor shall confirm all measurement on site prior to ordering any pipe fittings".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 5.13 PIPELINE RENEWAL WORK

All material recovered as a result of the repairs or replacement of the components shall be returned to the Contractors store where they shall be cleaned, sorted and listed. A list of the recovered material shall be handed to the Employer's Agent on a monthly basis. All recovered material shall be delivered to the Zandfontein Water Depot on a regular basis or at the end of the Contract.

ADD THE FOLLOWING NEW CLAUSE:

PSL 5.14 STERILISING OF WATER MAINS

All new water mains shall be sterilised at 10mg/l free chlorine for 12 hours and will then be thoroughly flushed.

PSL 7 TESTING

PSL 7.2 INITIAL TESTS ON WELDED STEEL PIPES

PSL 7.2.2 Radiographic Examination

Fifteen percent of all field welded joints, as ordered by the Employer's Agent, shall be examined radiographically as scheduled. All other welds (inside and outside) shall be subjected to a dye penetrant test as per Clause 7.2.1 of SABS 1200L and the costs associated with this work shall be included in the rates for the pipeline or elsewhere as no separate item has been scheduled for this activity.

PSL 7.2.3 Hydrostatic Test

- (a) All pipes and fittings shall be subject to an approved hydrostatic test and to a test pressure determined as follows:

$$P = 2000 \text{ t f}$$

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D

Where

- P = test pressure in kPa
- F = 85 percent of the guaranteed minimum yield strength in MPa for steel plate
- D = outside diameter of the pipe in mm
- T = wall thickness in mm.

- (b) Hydrostatic testing shall not be carried out until all aspects of fabrication have been completed.
- (c) The pressure shall be applied steadily by approved means and maintained without variation sufficiently long for proof and inspection.
- (d) Should water sweat or ooze from any part or any defects of any nature be discovered the pipe shall be emptied and the defects made good. The pipe shall then be tested again. Should a pipe, after repair, fail to pass the second hydraulic test the Employer's Agent may order its rejection.
- (e) The fact that any pipe may have passed the hydraulic test at the works shall not exempt the Contractor from his liability under Clause 7 of the General Conditions of Contract 2015.
- (f) If a pipe fails to pass any of the above tests in Clauses PSL 7.2.1, PSL 7.2.2 or PSL 7.2.3, it shall be rejected, but the Employer's Agent may permit repairs or alterations to be made to enable the pipe to pass the test.
- (g) The Employer's Agent may require one or more pipes to be tested to destruction. If practicable the Employer's Agent may require the Contractor to repair the pipes and retest them. The cost of repairs will be paid by the Employer as an extra to the Contract".

ADD THE FOLLOWING NEW SUBCLAUSE:

"PSL 7.5 VALVES

a) Gate Valves

All gate valves shall be flanged isolation valves to SABS 664, Class 40 or class 16 as specified, anti-clockwise closing. All valves 400 mm and bigger are to be supplied with an approved open spur gear box assembly with a gear ratio of 6:1, complete with a valve toby and shall have separate by-passes with an appropriate size complete with valves.

1. For the 500 mm and 400mm Valves:

Wedge type gate valves, PN 16 or PN 25 as specified in the BoQ. Multi-Stage Spur gearing with 6:1 minimum ratio, having operating spindles on the input spindle and at a stage where the valve can be stroked without exceeding the maximum input torque of 275Nm if no differential pressure is applied to the valve. Valves to be supplied with a 100 mm bypass valve.

1.1 For the 100 mm Valve:

Wedge gate valve PN 25.

2. The gears shall be robust and machine cut and their mounting shall be of substantial design.

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3. Each pinion gear spindle shall be supported between two bearings or alternatively one bearing of sufficient depth to prevent misalignment of the opinion gear and spindle. The bearings shall be fitted with bronze bushes and shall be provided with grease nipple lubricating points and shall be lubricated prior to delivery. All points to be lubricated shall be fitted with 1/8 inch BSP straight nipples for grease-gun lubrication. Adequate lubrication shall be provided for all gear and indicator bushes.
4. All valves shall open by anti-clockwise rotation of the main spindle and gearboxes shall be fitted with an intermediate idler where necessary.
5. In the case of Type A and Type B gearing a shear pin or other safety device shall be incorporated between the high and low gears to prevent damage to the valve if excessive force is applied. Two spare pins shall be attached to each valve.
6. Shear pins shall be easily replaced in the field. Hard-driven pins will not be accepted as shear pins.

b) Air Valves

Air valves must be double acting air valves of compact single chamber design with both small and large air release orifices inside the chamber. The valve must also act as a vacuum breaker, with intake capacities of 60 % of discharge rates given.

The unit measurement for valves shall be number of each described assembly.

The rate shall include supply installation and testing including for all corrosion protection, bolts, gaskets, and any other contingency work.

c) Water Meters

The 400 mm (Class 40) and the 750 mm (Class 16) flow meters are to be electromagnetic flow meters, to be supplied, delivered, installed and commissioned.

The meter will consist of a primary head, which is to be installed in a water pipeline and a remote wall-mounted signal converter.

The principle of operation is in accordance with Faraday's Law of Induction, whereby field coils in the primary head are energized through a pulsed direct current from the signal converter.

The flow meter shall be of the electromagnetic type, utilising pulsed DC excitation and shall be microprocessor based. It shall be capable of measuring flow rate and flow total in both directions, with two independent totalisers to give flow for network management purposes.

There shall be separate isolated analogue (4 to 20 mA) and pulse outputs (volts free) for forward and reverse flow. These outputs shall be fully user configurable.

The accuracy shall be better than 0,15% of the reading or +/- 1 mm/s whichever is the greater, in both forward and reverse directions. The working flow range shall be 10 mm/s to 15 m/s (i.e. 1500:1).

The repeatability shall be 0,05% of the reading or better. This performance is required for water management and/or billing purposes.

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The meter shall offer lifetime stable zero so that routine zeroing is not required. The meter shall automatically indicate zero flow under empty pipe sensor conditions.

The meter performance shall have been verified on a test facility that is internationally acceptable (such as NAMAS, NIST, or equivalent), such that fully traceability is assured. Laboratory traceability packs shall be available on request.

It shall be possible to verify the calibration of the complete flow system (sensor and transmitter) in-situ, without removal of, or access to the sensor. A calibration certificate shall be provided. Condition monitoring of the sensor, transmitter and interconnection cable shall be available to provide verification of long-term satisfaction field system operation. This shall be traceable and shall conform to ISO 9000 series quality standards.

The meter shall be designed and manufactured under the ISO 9000 series quality standards. The meter shall have lay lengths to current ISO standards for magnetic meters to facilitate interchangeableness of products.

The wetted materials shall be compatible with, and suitable for, the appropriate application. An internationally recognized body such as WRC, AWWA, or equal shall certify the liner. Acceptable electrodes are stainless steel, Hastelloy C, Tantalum, or Titanium.

The power supply shall be 85 - 265 v AC, 40 - 400 Hz for mains powered devices, or 24 v for DC powered devices without the need for link setting or voltage selection to allow for dips and surges without disruption.

The impedance shall be 10 to the power 15 ohms or greater so that electrode fouling does not affect signal integrity.

The meter shall be furnished with built-in grounding electrodes of the same material as the sense electrodes.

The flow sensor shall be rated IP68, and be suitable for indefinite submergence to a depth of 10 m.

Multiple diagnostic and self-monitoring functions such as empty pipe detection, low/high flow, reverse flow, flow over-range, etc. shall be standard features. Integral and dual output alarms shall be provided. Serial communication shall be provided as standard. It shall be possible to pre-commission the system using a configurator and verify all display and outputs.

Dual or triple line alphanumeric backlit display shall indicate user defined flow rate and flow total units and all menu selection shall be possible from outside the electronic housing.

Data shall be stored in non-volatile memory with a retention capacity of 10 years.

The meter software shall incorporate dual password features, to prevent inadvertent or fraudulent program or unit changes.

The electronic housing may be integral or remote and may be safety certified to FM, CENELEC, CSA.SAA, or Gost standards for international usage without the need for air purging. It shall be NEMA 4X/IP65 or better with separate electronics and termination areas for enhanced protection. The system shall conform to EMC Directive 89/336/eec to 10 v/m, for electromagnetic radiation susceptibility standards.

The tube must be lined with an approved potable water liner - neoprene or hard rubber, which will stand up to the duty and conditions specified. Vacuum conditions must be considered.

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All end connections shall be flanged, drilled to SABS 1123, Table 1 000 / 3 or table 4 000 / 3 as specified.

A set of earth rings and copper connecting wire must be supplied with each primary head.

Electrical protection must be class IP68.

The signal converter must be of the wall-mounted type.

It must be possible to use a signal converter with any other primary head of the same make, with reasonable accuracy.

The maximum cable run between a signal converter and its primary head will be 100 m.

Power supply will be 24 V direct current with battery backup.

Easily accessible, numbered, screwed – clamp terminal blocks must be provided in the terminal boxes.

Prices for additional cable must be quoted in the Bill of Quantities.

The signal cable must have double shielding and consist of 1,5 mm² stranded drain wire, 2 x 0,5 mm² stranded insulated wire leads, first-metal foil shield, insulation, 0,5 mm² stranded drain wire, second-metal foil shield and outer sheath.

Battery powered units must have provision for intermittent energizing of the sensor field winding and a minimum battery life of two (2) years.

Output signals shall be suitable for data loggers.

The meters must be connected to the Johannesburg Water Telemetry system via the instrumentation hut. For this purpose, 130m of power cable must be supplied, as well as 130 m of data cable.

The unit must be free from interference voltages. The Contractor must submit details of the protection that will be provided against stray currents, ground currents and lightning. (SABS 1529- 9)

Analogue and frequency outputs must include the following features:

- Selectable as 0-20 mA or 4-20 mA.
- Adjustable to 22 mA maximum.
- Current output connections to suit the above.
- Current output galvanically isolated.
- Flow indication in either direction.
- Automatic range change and selectability.
- Low flow cut-off on analogue outputs.
- Adjustable damping outputs.

24 V(5 V selectable) for electronic counter (1 Ohm resistance) on frequency outputs.

24 V output for Electro-mechanical counter with selectable pulse width.

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Frequency shall be adjustable, so that 10 to 36 x 106 pulse/hour can be made to coincide with the selected maximum flow range.

Display to be through LCDs and must indicate totalised flow and instantaneous flow rate in selectable unit.

Totalised flow (forward and reverse) and flow rate can either appear simultaneously or flash alternatively.

Selectable status indication must be provided for:

- Errors.
- Range change.
- Flow direction.
- Analogue and frequency output exceeded.

A zero-check facility must be provided.

Meters are to be installed with comprehensive flange insulation kits.

d) Pressure reducing valves

The pressure will be reduced in two steps. During the first step (or upstream PRVs) pressure will be reduced from 17 bar to 6 bar. The second step (or downstream PRVs) will reduce the pressure from 6 bar to 1.5 bar. Upstream PRVs and downstream PRVs will be rated PN 40. Upstream PRVs will be of the proportional type and downstream PRVs will be of the modulated type. Upstream PRVs will be flanged to SABS 1123 table 4 000 / 3 and downstream PRVs will be flanged to SABS 1123 table 4 000 / 3. The valves must be able to operate at a maximum of 240 l/s each. Upstream PRVs are also to be fitted with pressure transducers to be connected to Johannesburg Water telemetry. An additional 120 m of power cable and 120 m of data cable must be supplied for this purpose. The tow downstream bypass PRVs must be fitted with insertion flow meters to be connected to Johannesburg Water Telemetry. An additional 120 m of power cable and 120 m of data cable must be supplied for this purpose. The pilot stems shall be guided by a Delrin busing in the spring casing above the diaphragm and totally removed from the flow of water in the main pilot chamber. The pilots shall be self-cleaning and self-flushing by locating the outlet in the bottom of the pilot ninety degrees to the inlet.

Valves shall be hydraulically operated globe valves. The inner valve assembly shall be top and bottom guided by means of bearing bushings. The inner valve assembly shall be the only moving part and shall be securely mounted on an AISI 316 Stainless Steel stem. Lower grades of Stainless Steel shall not be acceptable. The Stainless-Steel stem shall be provided with wrench flats for ease of assembly and maintenance. Wrench flats will be fully accessible when inner valve is assembled. All pressure containing components shall be constructed of ASTM A536-65 / 45 / 12 ductile iron.

Valves shall be provided with smooth frictionless motion and maximum low flow stability with actuation being achieved by the use of Rolling Diaphragm technology.

Valves shall have a protective fusion bonded epoxy coating internally and externally to a minimum of 250 microns. The protective fusion bonded epoxy coating shall conform to the ANSI / AWWA C116 / A21.16 (current version) specification. No machining of any external parts after final coating will be acceptable to ensure a continuous coating surface throughout the entire valve.

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The valve cover shall have a separate stem cap giving access to the stem for alignment check, spring installation and ease of assembly.

Valve bonnets shall be accurately located to bodies utilizing locating pins. Locating pins shall eliminate corrosion resulting from the use of uncoated ductile iron to ductile iron surfaces. Valves with lipped spigot covers shall not be acceptable due to risk of rust and difficulty in assembly.

Valves shall have the AISI 316 Stainless Steel seat and shall incorporate a two-piece seat and bottom guide design.

The valves shall form a drip-tight seal between the stationary stainless steel seat ring and the resilient disc, which has a rectangular cross-section and is retained by clamping on three- and one-half sides. The resilient disc shall be constructed of EPDM for normal service conditions.

All external fasteners shall be AISI 18-8 Stainless Steel with AISI 18-8 Stainless Steel washers. Mild steel studs or bolts will not be acceptable.

All repairs and maintenance shall be possible without removing the valve from the line. To facilitate easy removal and replacement of the inner valve assembly and to reduce unnecessary wear on the guide, the stem shall be vertical when the valve is mounted in a horizontal line.

Each valve shall be air tested prior to shipment. The standard test shall include leakage test, seat leakage test, and stroke test.

The valves shall be covered by a minimum three-year (3) warranty against defects in materials and workmanship. The stainless-steel seat shall be covered by a lifetime replacement warranty.

The auxiliary control system shall be fitted with a large filter assembly, to prevent fouling of the control system. This filter shall be fitted with a transparent drain cap, which allows maintenance personnel to inspect the strainer, without the need to shut of the system, or remove the strainer from service.

The main valve body shall be fitted with a visual position indicator, to offer the maintenance personnel visual indication of the valve position, as well as opening and closing speed controls. The strainer shall have an integral blowdown valve and discharge tube for facilitate the ease of maintenance.

e) Level control valves

The 400 mm ND Level Control Valves shall have a submersible altitude control pilot and have a pressure rating of Class 40, flanges shall conform to SABS 1123 table 4 000 / 3. The valves must be able to operate at a maximum of 240 l/s each. The valve must be able to function as a two- position control valve, either fully open or fully closed. The valve must allow normal forward flow to fill the reservoir to the maximum level and then close drip-tight at the set-point. It must open to refill the tank once the level drops a fixed distance below the high-water level. The pilot control shall be supplied complete with an adjustment range of between 3 m and 18 m.

Valves shall be hydraulically operated globe valves. The inner valve assembly shall be top and bottom guided by means of bearing bushings. The inner valve assembly shall be the only moving part and shall be securely mounted on an AISI 316 Stainless Steel stem. Lower grades of Stainless Steel shall not be acceptable. The Stainless-Steel stem shall be provided with wrench flats for ease of assembly and maintenance. Wrench flats will be fully accessible when inner valve is assembled. All pressure containing components shall be constructed of ASTM A536-65 / 45 / 12 ductile iron.

Valves shall be provided with smooth frictionless motion and maximum low flow stability with actuation being achieved by the use of Rolling Diaphragm technology.

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Valves shall have a protective fusion bonded epoxy coating internally and externally to a minimum of 250 microns. The protective fusion bonded epoxy coating shall conform to the ANSI / AWWA C116 / A21.16 (current version) specification. No machining of any external parts after final coating will be acceptable to ensure a continuous coating surface throughout the entire valve.

The valve cover shall have a separate stem cap giving access to the stem for alignment check, spring installation and ease of assembly.

Valve bonnets shall be accurately located to bodies utilizing locating pins. Locating pins shall eliminate corrosion resulting from the use of uncoated ductile iron to ductile iron surfaces. Valves with lipped spigot covers shall not be acceptable due to risk of rust and difficulty in assembly.

Valves shall have the AISI 316 Stainless Steel seat and shall incorporate a two-piece seat and bottom guide design.

The valves shall form a drip-tight seal between the stationary stainless steel seat ring and the resilient disc, which has a rectangular cross-section and is retained by clamping on three- and one-half sides. The resilient disc shall be constructed of EPDM for normal service conditions.

All external fasteners shall be AISI 18-8 Stainless Steel with AISI 18-8 Stainless Steel washers. Mild steel studs or bolts will not be acceptable.

All repairs and maintenance shall be possible without removing the valve from the line. To facilitate easy removal and replacement of the inner valve assembly and to reduce unnecessary wear on the guide, the stem shall be vertical when the valve is mounted in a horizontal line.

Each valve shall be air tested prior to shipment. The standard test shall include leakage test, seat leakage test, and stroke test.

The valves shall be covered by a minimum three-year (3) warranty against defects in materials and workmanship. The stainless-steel seat shall be covered by a lifetime replacement warranty.

The auxiliary control system shall be fitted with a large filter assembly, to prevent fouling of the control system. This filter shall be fitted with a transparent drain cap, which allows maintenance personnel to inspect the strainer, without the need to shut of the system, or remove the strainer from service.

The main valve body shall be fitted with a visual position indicator, to offer the maintenance personnel visual indication of the valve position, as well as opening and closing speed controls. The strainer shall have an integral blowdown valve and discharge tube for facilitate the ease of maintenance.

f) Flow control valves

The 400 mm ND flow control valves shall be a globe (angle) style valve and have a pressure rating of Class 40 and flanges shall conform to SABS 1123 table 4 000 / 3. The valves shall have a flow set-point to 240 l / s each. The valve must maintain a relatively constant flow rate by sensing the pressure differential across the specially sized orifice plate. The flow rate must be adjustable by changing the pilot's setting. When the pressure differential is less than the set-point the valve opens allowing flow to meet pre-determined demand. When the pressure drop across the installation exceeds the set-point, the valve closes slightly to limit the flow to the pre-set maximum. The orifice shall be sized to generate a pressure differential of 0.2 bar to 0.35 bar at the desired flow. Adjusting the pilot setting permits the maximum flow to be changed in the field above or below the original point.

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Valves shall be hydraulically operated globe valves. The inner valve assembly shall be top and bottom guided by means of bearing bushings. The inner valve assembly shall be the only moving part and shall be securely mounted on an AISI 316 Stainless Steel stem. Lower grades of Stainless Steel shall not be acceptable. The Stainless-Steel stem shall be provided with wrench flats for ease of assembly and maintenance. Wrench flats will be fully accessible when inner valve is assembled. All pressure containing components shall be constructed of ASTM A536-65 / 45 / 12 ductile iron.

Valves shall be provided with smooth frictionless motion and maximum low flow stability with actuation being achieved by the use of Rolling Diaphragm technology.

Valves shall have a protective fusion bonded epoxy coating internally and externally to a minimum of 250 microns. The protective fusion bonded epoxy coating shall conform to the ANSI / AWWA C116 / A21.16 (current version) specification. No machining of any external parts after final coating will be acceptable to ensure a continuous coating surface throughout the entire valve.

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Valves shall have the AISI 316 Stainless Steel seat and shall incorporate a two-piece seat and bottom guide design.

The valves shall form a drip-tight seal between the stationary stainless steel seat ring and the resilient disc, which has a rectangular cross-section and is retained by clamping on three- and one-half sides. The resilient disc shall be constructed of EPDM for normal service conditions.

All external fasteners shall be AISI 18-8 Stainless Steel with AISI 18-8 Stainless Steel washers. Mild steel studs or bolts will not be acceptable.

All repairs and maintenance shall be possible without removing the valve from the line. To facilitate easy removal and replacement of the inner valve assembly and to reduce unnecessary wear on the guide, the stem shall be vertical when the valve is mounted in a horizontal line.

Each valve shall be air tested prior to shipment. The standard test shall include leakage test, seat leakage test, and stroke test.

The valves shall be covered by a minimum three-year (3) warranty against defects in materials and workmanship. The stainless-steel seat shall be covered by a lifetime replacement warranty.

The auxiliary control system shall be fitted with a large filter assembly, to prevent fouling of the control system. This filter shall be fitted with a transparent drain cap, which allows maintenance personnel to inspect the strainer, without the need to shut of the system, or remove the strainer from service.

The main valve body shall be fitted with a visual position indicator, to offer the maintenance personnel visual indication of the valve position, as well as opening and closing speed controls. The strainer shall have an integral blowdown valve and discharge tube for facilitate the ease of maintenance.

g) Conductivity Probe

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Witness:		Witness:	



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The conductivity probe must be installed in the overflow pipe to indicate the presence of water. The probe must be connected to the telemetry, and for this reason, 60 m of power cable and 60 m of data cable must be supplied.

PSL 8 MEASUREMENT AND PAYMENT

PSL 8.2 SCHEDULED ITEMS

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.16 c) Demolish Structure

- a) Description of connection, types and diameters involved.....Unit: No
- b) Etc for the other items

The unit of measurement shall be sum for various types of connection into existing line mains.

The rate shall cover the cost of excavation, plant and labour required, demolishing the existing chambers, safeguarding the existing valves and specials from damage and safely disposing of the rubble material.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.17 Connect to Existing Mains

- a) Description of connection, types and diameters involved.....Unit: No
- b) Etc for the other items

The rate shall cover the cost of isolating, cutting, excavation (up to 2 m deep), bedding, dewatering and exposing the existing main at the connection point, supply necessary fittings for under pressure connections for the section of the mains as required, temporary support, safety precaution backfilling and the removal of surplus and unsuitable material. The supply and installation of fittings and couplings shall be measured separately.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.18 Recover valves, fittings, specials, etc

- a) Description of item..... Unit: No.
- b) Etc for other item

The unit of measurement shall be number of described item to be recovered.

The rate for the recovery of the above shall cover the cost of the excavation, breaking out existing brick or precast concrete, and removal of the valves, fittings and specials removal of debris and spoil to Contractor's dump site and importing suitable backfill material, the plugging with concrete of the open ends of the abandoned water mains, the removal of the surface boxes, backfilling to required density, the handling and transporting of the recovered materials to the Zandfontein Depot, the listing of the salvaged materials and the backfilling and compaction of the chambers and reinstatement of surface covering.

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PSL 8.2.20 Cathodic
Protection Unit: Sum

The rate shall include investigation, design, supply and commission system as per specified and/ or instructed by the Employer's Agent (Provisional Sum)

PSL 8.2.21 Supply and install fittings
assembly Unit: No

The unit of measurement shall be number of a described item to be installed. The applicable particular specification contained herein on various clauses will apply to the various pieces, for example **PSL 8.2.19** will be applicable to any valve and air valve in the assembly.

The rate shall include supply installation and testing including for all corrosion protection, bolts, gaskets, and any other contingency work to enable the proper operation of the fittings assembly.

Employer:		Contractor:	
Witness:		Witness:	



PSLB BEDDING (PIPES)

PSLB 3 MATERIALS**PSLB 3.1 SELECTED GRANULAR MATERIAL**

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

“Selected granular material shall have a PI not exceeding 10 and shall be free from sharp-ended particles or particles exceeding 19 mm in size”.

“Selected fill material shall have a PI not exceeding 15 and shall be free from sharp-ended particles or particles exceeding 19 mm in size”.

PSLB 3.3 BEDDING

ADD THE FOLLOWING:

“uPVC and HDPE pipes are deemed to be flexible pipes for the purposes of this subclause”.

PSLB 3.4 SELECTION**PSLB 3.4.1 Suitable material available from trench excavation**

REPLACE THE WORDS “(but is not required)” IN THE FIFTH LINE WITH THE WORDS “(at his own cost)”.

PSLB 7 TESTING**PSLB 7.1 DENSITY**

REPLACE THE SECOND SENTENCE IN THE FIRST PARAGRAPH WITH “The test will be carried out using the Troxler method”.

ADD THE FOLLOWING SUB-CLAUSE

PSLB 7.1.1 Submission of bedding compaction test results

The Contractor will be required to submit to the Employer’s Agent four (4) compaction test results of bedding for every 100metres. Bedding compaction to be 90% MOD AASTHO density. The compaction tests to be performed by the Troxler method.

PSLB 8 MEASUREMENT AND PAYMENT**PSLB 8.1 PRINCIPLES**

ADD THE FOLLOWING TO THIS SUB-CLAUSE

PSLB 8.1.3 Volume of bedding materials

The volume of bedding material shall be measured net i.e. the volume of the pipe is to be deducted.

PSLB 8.1.5 Disposal of displaced material

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DELETE THIS SUB-CLAUSE AND REFER TO CLAUSE PSDB 5.6.3:

PSLB 8.1.6 Free-haul

DELETE THE WORDS "of 0,5 km" IN THE FIRST LINE OF THIS SUBCLAUSE.

PSLB 8.2 SCHEDULED ITEMS

PSLB 8.2.1 Provision of bedding from trench excavations

DELETE THIS SUB-CLAUSE AND REPLACE WITH THE FOLLOWING:

Without the need for screening or other treatments:

a)	Selected	granular
material.	Unit: m ³	
b)	Selected	fill
material.	Unit: m ³	

The rates shall cover the cost of acquiring, from any point along the trench excavation as be Selected by the Employer's Agent within 5,0 km, bedding that complies with the relevant requirements of the specification, of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, and of disposing of displaced material within a free haul distance 5,0 km.

Including for screening and/or other treatment:

a)	Selected	granular
material.	Unit: m ³	
b)	Selected	fill
material.	Unit: m ³	

The rates shall cover the cost of screening by means of mesh sieves or otherwise treating excavated material, at any point along the trench excavation as may be selected by the Employer's Agent, in order to produce bedding that complies with the relevant specification, delivering it to points along the trench, within 5,0 km, 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, and of disposing of displace material within a free haul distance of 5,0 km.

PSLB 8.2.2 Supply only of bedding by importation

PSLB 8.2.2.3 From commercial sources (Provisional)

ADD THE FOLLOWING SUB-SUBITEM TO THIS CLAUSE:

- “(c) Special bedding material
- 1) Description of material... Unit: m²
or m³
 - 2) Etc for other items

The unit of measurement shall be the square metre or cubic metre of material as specified.

The rate shall cover the cost as specified for (a) and (b)”. The rate shall include the cost of acquiring from commercial sources, transporting regardless of distance, offloading and placing in the trench bottom clean where ordered by the Employer's Agent.

ADD THE FOLLOWING SUB-SUBCLAUSE:

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Witness:		Witness:	



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PSLB 8.2.6 Compaction Test

Compaction testing using the troxler method..... Unit:
No

PSLC CABLE DUCTS

PSLC 3 MATERIALS

PSLC 3.1 DUCTS

ADD THE FOLLOWING:

PSLC 3.1.1 Split uPVC pipes

Split pipes shall only be used to provide ducts for existing services that cannot be severed and threaded through the ducts. The pipes shall be cut accurately in the middle, and opposite halves shall be matched as sawn. Split pipes shall be placed around the service, firmly bound by steel straps, and encased in concrete".

PSLC 3.4 CABLE DUCT MARKERS

ADD THE FOLLOWING:

"A cable duct marker shall consist of a 300 mm x 300 mm x 100 mm deep, class 20 MPa/19 mm concrete block, connected by means of a non-ferrous metal strip to a temporary plug to seal the end of the duct. The plug shall prevent moisture or soil from entering the duct. The metal strip shall be firmly connected to both the plug and the concrete block. The concrete block shall be positioned not further than 0,5 m horizontally from the end of the cable duct. The face of the concrete block shall be clearly marked "E" to indicate electricity cables".

PSLC 8 MEASUREMENT AND PAYMENT

PSLC 8.2 SCHEDULED ITEMS

PSLC 8.2.5 Supply, lay, bed and prove duct

REPLACE THE PAYMENT PARAGRAPH WITH THE FOLLOWING:

"Separate items are scheduled for each diameter of duct.

The rates shall cover the cost of providing all the materials and the cost of laying the ducts, installing the draw wire, jointing, bedding and providing all as specified."

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Witness:		Witness:	



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PSSC SUB-CONTRACTORS

PSSC 1 Value of Sub-Contracted Works

The Main Contractor shall retain liability and responsibility for the management, scheduling, and quality control of all works performed by the sub-contractors. After appointment of the Main Contractor, the Main Contractor can approach potential sub-contractors to provide rates for the items marked with SC in the Bill of Quantities. The Main Contractor will be expected to conduct a competitive process to recommend a Sub-Contractor or Sub-Contractors to Johannesburg Water. Johannesburg Water will then evaluate all rates provided by the Sub-Contractor for fairness. Johannesburg Water will then either a) approve the appointment of the Sub-Contractor or Sub-Contractors or b) enter into negotiations with the Main Contractor and sub-contractor / s or c) request that the Contractor recommend a different sub-contractor.

..... Unit: Prov Sum

PSSC 2 Overhead, charges and profit fee for the Main Contractor to oversee sub-contracted works.

The Main Contractor shall retain liability and responsibility for the management, scheduling, and quality control of all works performed by the sub-contractors. This item will be calculated as a percentage of the sum of works allocated to the sub-contractors and shall include the process to appoint a sub-contractor as described in PSSC 1, as well as all costs and charges to manage all sub-contracted works..

.....
Unit: %

PSSC 3 Fixed-charge items for the sub-contractors Contractual Requirements

The final amount will be determined by the process described under PSSC 1.....Unit: Prov Sum

PSSC 4 Overhead, charges and profit for the Main Contractor to provide for fixed-charge items for the sub-contractors Contractual Requirements.

This item will be calculated as a percentage of PSSC 3.
Unit: %

PSSC 5 Time Related items for the sub-contractors Contractual Requirements

The final amount will be determined by the process described under PSSC 1.....Unit: Prov Sum

PSSC 6 Overhead, charges and profit for the Main Contractor to provide for time related items for the sub-contractors Contractual Requirements

This item will be calculated as a percentage of PSSC 5.
Unit: %

PSSC 7 Training for SMMEs

This item will include for accredited and certified on-the-job training for SMMEs.....
Unit: %

Employer:		Contractor:	
Witness:		Witness:	



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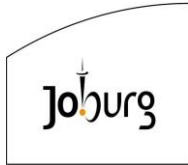
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**PSSC 8 Overhead, charges and profit for the Main Contractor to provide for training
for SMMEs**

This item will be calculated as a percentage of PSSC 7 Unit:

Employer:		Contractor:	
Witness:		Witness:	



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PORTION C: PARTICULAR PROJECT SPECIFICATIONS

SECTION W: HIGH MAST FOR LIGHTING OF THE RESERVOIR SITE

SECTION X: SPECIFICATION FOR RIGID POLYURETHANE COATING AND SOLVENT FREE LIQUID EPOXY LINING ON API 5L STEEL PIPE

SECTION Y: BOUNDARY WALL SPECIFICATION

SECTION Z: SOLAR PANEL FOR SCADA AND TELEMETRY

PORTION C: PARTICULAR PROJECT SPECIFICATIONS

SECTION W: SOLAR HIGH MAST FOR LIGHTING OF THE RESERVOIR SITE

PSW 1. SOLAR LED FLOOD LIGHT HIGH MASTS LIGHTING

The solar LED high mast lighting shall consist of:-

- 150Watt LED high illumination LED flood lights
- 400W mono crystalline solar PV panels
- Top mounted battery box/cabinet manufactured from 3C12 steel with enclosure
- 5.1kWh lithium LifePO 48-100A batteries
- Solar maximum tracker (MPPT) charge controllers
- Control electronic-interconnecting wire/cables and module mounting structure, at
- a height of 20 meters above the ground
- 19m/20m high mast pole split in sections, with 2m stubby to be buried in the ground
- in a cemented foundation. 17m/18m mast above the ground.

The solar LED high mast shall be designed in accordance with following requirements: -

- Design life of solar high mast be in excess of 5 to 10 years
- LED Luminaire rating of IP66.
- Die casted durable lamp housing shall be robustly constructed, weatherproof, hail proof, corrosion proof and vandal resistant. It shall be grey in colour.
- Luminaire shall have an operating temperature of -20°C to 55°C. The diffuser lens must be manufactured with polymethyl methacrylate (PMMA). The lamp shall consist of a LED board arrangement with a warranty. Must submit an IEC 60598-1 or IEC 60598-2-3 certification.
- The IP66 ingress protection rating shall ensure that all components are protected against the ingress of dust and moisture, which leads to corrosion and premature

failure. All screws, bolts and metal parts shall be stainless steel and anti-corrosion treated material.

- LED flood light must have a minimum of 22000 lumens (provide supporting lighting simulation results).
- 400W high efficiency mono crystalline silicon solar PV panel with IEC / TUV certification.
- Lithium LifePO battery (48V 100A) with charge-discharge cycles between 3000-6000 with 10 to 15 design life cycle.
- Luminaire shall have a maximum power point tracker (MPPT) controller with a 96% charging efficiency.
- Luminaire weight 6kg per luminaire.
- Luminaire correlated colour temperature (CCT) shall be 5000K with a CRI of >70.
- Luminaire shall be supplied with a galvanized mounting bracket.
- IEC or TUV certification shall be provided for solar panels, lithium battery, and for solar controller.

PSW 2. PHOTOMETRIC REQUIREMENTS

Attach detailed calculations to confirm photometric results, to the tender document. Submit the photometric data based on measurements undertaken by an internationally certified lighting laboratory. The photometric report shall contain:

- Absolute candela values, at an ambient temperature of 24.5°C and humidity of 65.7%
- Description and photograph of the luminaire under test.
- Supply voltage and LED currents during testing.

Calculations shall be based on the following criteria:

- LED lumen depreciation of 80%
- Maintenance factor of 0.9 (allowing for a 10% light loss due to dirt on the protector surface).

PSW 3. SOLAR CONTROLLER UNIT

The solar controller unit shall have ff.

- Charging temperature at daytime shall be between 0°C to 60°C When temperatures goes below 0°C, the control system will automatically stop to protect the battery.
- When temperatures go higher than 0°C, Discharging temperature at night is between - 20°C to 60°C.

PSW 4. WARRANTY

- The bidder shall provide a warranty that the goods supplied under the contract are new, unused, of the most recent or current models and incorporate all recent improvements in design and materials. The bidder shall warrant that all goods supplied under this contract shall have no defect, arising from design, materials, or workmanship or from any act or omission of the supplier, that may develop under normal use of the supplied goods under prevailing site conditions.
- The bidder shall warrant that each luminaire supplied under the contract shall have a maximum lumen depreciation of not more than 10% of the original lumen output of the luminaire during the period of warranty.
- The warranty shall remain valid for fifty-four (54) months after the goods or any portion thereof as the case may be, have been delivered.
- The Contractor shall promptly notify the service provider in writing of any claims arising under this warranty.
- Upon receipt of such notice, the service provider shall, within the specified period and with all reasonable speed, repair or replace the defective goods or parts thereof, without costs to JW.
- If the service provider, having been notified, fails to remedy the defect(s) within the specified period, JW may proceed to take such remedial action as may be necessary, at the service provider's risk and expense and without prejudice to any other rights which JW may have against the service provider under the contract.
 - 6x 150W – 132000lm minimum requirements
 - 9x 150W –

PSW 5. SOLAR HIGH MAST POLE SPECIFICATIONS

The solar high mast pole shall be supplied in four sections with flanges at the end of each section to bolt together, to construct a single high mast design.

The total length of 19m/20m – 17m/18m

- 2m mounting stubby with dimensions of 273mm diameter
- 6m 273mm
- 6m 219mm
- 5m 177mm

PSW 5. CONSTRUCTION

- Poles shall be of tubular design with a minimum diameter at the base of 275mm (outer diameter) and constructed in four sections by means of flanges welded to the base of each section.
- The steel used in manufacture of poles shall comply with SABS spec 1431 Grade 355WA with minimum yield strength of 355MPa. Bidder to provide test and analysis certificates. No steel sections shall be less than 3mm wall thickness.
- All welding shall be carried out by coded welders only. Proof that all welders have been tested shall be provided on request.
- Bidder to advise about supply of K-Clamp

PSW 6. DIMENSIONS

- Pole dimensions 127/101/76mm – poles shall be tubular design.
- The poles shall be 19m long with a 2m stubby suitable for planting in the ground, giving a mounting height of 17m.
- The poles shall at the upper end have a diameter of 177mm at the smallest point at the top of the mast.
- Access opening complete with cover, not smaller than 230 x 90 to be provided 2000mm above ground level. To be secured by two 5-sided stainless steel hot dip galvanized allen screws and galvanised mounting / gland plate.
- Earthing.
- The high mast shall be provided with earthing straps and rod which shall be fastened to mast as a safety measure.

PSW 7. CORROSION PROTECTION

All parts of the pole and its associated parts shall be hot dip galvanized to SANS 121 ISO 1461 specifications. Contractor to provide an inspection certificate upon request from JW.

No welding, drilling, punching, bending or removal of burrs shall be carried out after

galvanizing.

PSW 8. SCOPE OF WORK

The scope of work shall include design, manufacture, supply, install and commission of solar LED high mast lighting system including five years comprehensive warranty maintenance in various clusters within JW.

PSW 9. COMPLETE SOLAR HIGH MAST

A complete solar high mast should comprise of the following:

- 9 X 80W LED high illumination luminaires with battery packs and solar panel.
- Minimum 57AH 12,8V Lithium battery packs built into the LED luminaires
- The luminaire shall have an 18V 100W high efficiency mono crystalline silicon solar panel.
- A minimum 20m high (above ground) steel pole capable of mounting all of the above-mentioned LED luminaires, batteries and can withstand the load.
- The successful service provider will be required to assess the identified project sites and provide a layout for the solar high masts.

PSW 10. SOLAR RECHARGEABLE BATTERY

The solar rechargeable battery shall have the following features:

- The battery should be at least 57AH at 12,8VDC lithium LifePO battery packs.
- Battery service Life shall be more than 2000 times, under normal conditions.
- Operate in temperatures of between -30°C and 60°C.
- Have a charged maintenance ability according to IEC standards.
- Be capable of rapid charging in 1 to 6 hours.
- Battery enclosure shall be secured by means of steel tamper-proof allen/hex bolts to minimize theft and vandalism.

PSW 11. SOLAR RECHARGEABLE BATTERY

The solar LED high mast luminaire shall have the following specifications and parameters:

- Photocell
- 10° to 45° tilt angle
- Power output – 150W
- Voltage 48VDC
- Voltage fluctuation – 10% of rated voltage
- IP rating of IP66
- Minimum luminous flux of 22000Lm
- Colour temperature of 5000K
- Mounting height of 17m / 18m
- Working temperatures -30°C to +60°C
- Lighting time of 7 days a week, 12 hours a day/nights
- High efficiency LED > 130 lumens/Watt (bidder to provide proof or evidence)
- Colour rendering index (CRI) of 70/80
- Working lifetime of 50000 hours at 80% lumen maint. (Bidder to provide proof or evidence confirming statistical correlation).
- Warranty period of 5 years

Submit a report for LEDs used in the luminaire, which shall include ff.:

- Measured LED junction temperature for a given test condition and extrapolated for an ambient temperature of 35°C.
- LED drive current.
- LED manufacturer data that clearly correlates LED junction temperature and LED drive current to lumen maintenance.
- Attach proof confirming that failure of one LED will not cause additional LED's to fail.
- Battery enclosure shall be secured by means of steel tamper-proof allen/hex bolts to minimize theft and vandalism.
- Controller must incorporate a temperature sensor which shall reduce the current to protect the LEDs at higher than rated ambient temperatures. The temperature sensor is not to switch off the LEDs at high temperatures.

PSW 12. MOUNTING POLE

The high mast pole to be designed in accordance to SANS 10225 under the ff. criteria and working loads:-

- Terrain category 3
- Design wind speed 40m/s
- Altitude 0m
- Horizontal and vertical deflections shall not exceed the requirements of SANS 10225.

The high mast pole shall be a galvanized steel pole with ff. minimum requirements

- At least 17m above ground level
- Strength of 500KN – withstand total weight of up to 5,000kg.
- Working load of 144km/h cross winds.
- Mechanical winch to hoist up the luminaires up and to lower them to a working height that is reachable for maintenance purposes.
- Brackets to be mounted underneath top mounted battery enclosure to support the 150W LED luminaires

PSW 13. BASE

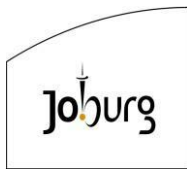
The base shall consist of the following:

- 2600x2600x2000 steel foundation for concrete base.
- The high mast foundations shall be designed and constructed in accordance with SANS 10100 (Pt 1 & Pt 2) to withstand the forces imposed by the mast. The soil conditions and the soil bearing capacity shall be determined by a set of DCP tests for each individual mast. The results of these tests shall be recorded and placed in the project file for each high mast installation.
- The concrete cover of the reinforcing bars shall be not less than 50mm in all cases. The contractor shall provide evidence of the actual concrete cover achieved for the base and the plinth. The concrete shall have a design compressive strength of not less than 25 MPa after 28 days. The concrete strength of the base and the plinth shall be measured after 28 days by the Schmidt Hammer Test method for each foundation. The test results shall be recorded in the high mast project file.
- The plinth shall be designed to have a projection of not less than 300mm above nominal ground level after backfill compaction has been completed.

PSW 14. LIGHTNING CONDUCTOR

Each high mast shall be fitted with a lightning conductor spike at the top point of the luminaire. This spike shall be connected to the highmast earthing system. The steel high mast may be used as the earth path provided that a 70mm² flexible copper cable is installed at hinge point to ensure that electrical currents do not pass through the hinge joint. The high mast shall be connected to the earthing system by means of a 16mm diameter stud welded to the inside of the mast.

PSW 15. GEO TECHNICAL SURVEY



The contractor shall be responsible for determining the soil conditions for each high mast location. This information shall be to the satisfaction and approval of the JW to ensure design confidence.

PSW 16. PROCEDURES REGARDS EXISTING SERVICES AND EXCAVATIONS

- The contractor shall be required to take special care to locate existing services that would be affected by the installation of the high mast. The contractor will be responsible for the repair and reinstatement to any services damaged by them or any of their sub-contractors.
- In the event of damage occurring to any existing services, the contractor shall immediately notify JW and the owner of the service.
- All repairs to these services shall be to the satisfaction of the JW and the owner of the service.
- Penalties including consequential damage shall be levied at the sole discretion of JW for damage to existing services caused under the following circumstances.
- Damage due to unauthorized excavation
- Damage due to unauthorized blasting activities.

PSW 17. DESIGN FREEZE

Upon review and acceptance of drawing and calculations by JW the design of each highmast shall be fixed. No modifications, revisions, or changes shall be made to the design and drawings, after this date, without prior written application to JW. The application shall include full technical and commercial motivation for the changes.

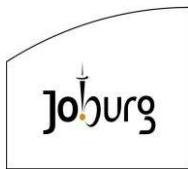
PSW 18. THEFT AND VANDALISM

Battery Enclosure and Solar Panels shall be secured by means of steel tamper-proof allen/hex bolts to minimize theft and vandalism.

PSW 19. NORMATIVE REFERENCES

The following table contains provisions that, through reference in the text, constitute requirements of the specifications. At the time of publication, the editions indicated were valid.

All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.



SANS / NRS STANDARDS STANDARD DESCRIPTION

NRS 025 Photo Electric Control Units for Lighting (PECU)

ARP 035 Guidelines for the Installation and Maintenance of Street

Lighting

SANS 121 Hot dip galvanized coatings on fabricated iron and steel articles

SANS 1088 Luminaire entries and spigots

SANS 1200 A General

SANS 1200 C Site clearance

SANS 1200 D Earthworks

SANS 1200 G Concrete structural

SANS 1200 H Structural steelwork

SANS 1200 HC Corrosion protection of structural steelwork

SANS 1431 Weldable structural sheets

SANS 2001 – CS1 Construction works : Structural steel works

SANS 10100 The structural use of concrete (Part 1 and 2)

SANS 10162 The structural use of steel : The limit states design of hot rolled steelwork

SANS 10214 The design, fabrication and inspection of articles for hot dip galvanizing

SANS 10225 The design and construction of lighting masts

SANS 60529 Enclosure for electrical equipment (Classified according to degree of protection that the enclosure provides)

SANS 60598-2-3 Luminaires : Particular requirements for road and street lights luminaires

SANS 62305-3 Protection against lightning

PSW 20. PAYMENT ITEMS

PSW 20.1 Fixed-charge items for

Prepare site, Supply and install Solar High Mast lighting, including all civil, structural, electrical and mechanical installation Unit: Prov Sum

PSW 20.2 Overhead, charges and profit for fixed-charge item PSW 20.1

This item will be calculated as a percentage of PSW 20.1 Unit: %

Specification For Rigid Polyurethane Coating And Solvent Free Liquid Epoxy lining On API 5L Steel Pipe

January 2017

Ref: JWEL1701.101

Scope

This Specification defines the minimum technical requirements for Liquid Applied Coating and lining for factory coated pipe and specials. The external coating system shall comprise a layer of rigid polyurethane applied in a single coating operation to a thickness of 1.7mm. The internal lining system shall comprise plural component hot applied solvent free epoxy to a thickness of 600µm.

The contractor's scope shall include, but not necessarily be limited to the following:

- Pre cleaning
- Surface preparation
- Application
- Testing of applied coating

The pipeline will be buried and will be protected against external corrosion by external coating and cathodic protection systems.

The external coating shall be suitable for the operating conditions applying to this pipeline and shall have proven good resistance to cathodic disbondment and cathodic over potential. This document supplements the requirements of other project Specifications and Standards for the performance of the work.

Note: The connotation of the following words will be:

- **Shall** – denotes that the requirement is mandatory.
- **Should** – denotes that the requirement is highly recommended but not mandatory.
- **Approved or Approval** – denotes approval in writing by the Corrosion Engineer of Johannesburg Water (CE) or his nominated representative/s.

Contractor's Responsibilities

The Contractor shall obtain the Corrosion Engineer's Approval for any deviation from this Specification or referenced code, standard or project document, in writing at time of tendering. Changes requested later are likely to be rejected.

In the event of any conflict between this Specification, any referenced documents and the Project Data Sheet; the Contractor shall request written clarification of the requirements from the Corrosion Engineer.

Only subcontractors approved by the Corrosion Engineer shall be employed.

STANDARDS AND CODES

Coatings shall be applied in accordance with the requirements of this Specification and the Manufacturers' Specifications.

The order of precedence between this Specification and industry documents is:

- Project Specifications
- Project Datasheet
- Manufacturer's Specifications
- Standards and Drawings
- Industry Codes and Standards

Quality System

The coating operation shall be governed by a documented Quality System, which ensures that the requirements of this Specification are met in every respect.

The Quality System shall be based upon recognized quality standards, of which ISO 9001 is a suitable example. Quality Assurance systems to other equivalent standards may be used if approved by the Corrosion Engineer.

The Contractor Quality Assurance Group shall have been established, which shall be responsible for reviewing the Quality System and ensuring that it is implemented.

Application and test procedures, which comprise the Quality System and the Inspection & Test Plan, shall be submitted to the Corrosion Engineer for Approval.

The Quality System shall include control of material and equipment suppliers and subcontractors and shall ensure that the requirements of this Specification are satisfied by the suppliers and subcontractors operating quality systems in their own organizations.

A Quality Plan and Inspection & Test Plan for the activities necessary to satisfy the requirements of the Specification shall be prepared and issued to the Corrosion Engineer for Approval before commencement of work.

The Quality Plan and Inspection & Test Plan shall include any sub-contracted work and the sub-contractor's Quality Plans shall be submitted to the Corrosion Engineer for Approval.

The Quality Plan shall be sufficiently detailed to indicate sequentially, and for each discipline, the requisite quality control, inspection, testing, and certification activities with reference to the relevant procedures and the acceptance standards.

The Quality System and associated procedures may, with due notice, be subject to formal audits by the Corrosion Engineer.

The application of quality control will be monitored by the Corrosion Engineer's inspectors, who will witness and accept on behalf of the Corrosion Engineer the inspection, testing, and associated work required by the Specification. The provision of inspection services reporting directly to the Corrosion Engineer shall in no way relieve the Contractor of the responsibility to ensure that the full scope of work is carried out entirely in accordance with the Specification, the agreed Quality Plan and Inspection & Test Plan.

Functional Requirements

The coating shall be applied to provide corrosion protection to the pipeline and specials over the design lifetime.

Contractor shall demonstrate that the coating system will fulfil the requirements before production starts.

This shall be demonstrated by complying with the coating qualification procedures herein.

Contractor shall demonstrate that the coating, as applied during normal production, fulfils the requirements by effective quality control procedures in accordance with this specification.

Preference will be given to materials that do not require post application heating to facilitate cure.

The coating shall be suitable for use with cathodic protection and at ambient temperatures.

Technical Requirements

Application shall be by an approved, qualified, and experienced specialist coating contractor.

The specialist contractor, if new to Johannesburg Water, shall submit a full and comprehensive documentation package demonstrating a long term track record of successful completion of identical scopes of work on projects of the same scale.

Materials

The required external coating shall be a two component liquid applied rigid polyurethane.

The required internal coating shall be a two component liquid applied solvent free epoxy. A valid potable water certificate must accompany the data sheet of the material to be used.

The minimum documentation to be provided is detailed at Table 2.

Coating Material Requirements

The two coating components shall have different colours allowing the verification of the correct mixing and checking of the uniformity of the colour of the mixed product.

The external coating is considered cured when it has attained the hardness recommended by the product manufacturer and has passed an adhesion test in accordance with Table 3

The coating materials shall be handled, stored, applied, and cured in accordance with the recommendation of the material manufacturers.

Contractor shall submit, with the quotation, certified test reports and data as listed in BS EN 10290, Table 1 and SANS 1217 Tables 1 and 3 as applicable. Requirements additional to those of BS EN 10290, Table 1 are detailed in Table 2 of this specification

Surface Preparation

All inspection and testing associated with surface preparation shall be based on BS EN 10290, Section 8 and, where necessary, modified as shown in Table 4 of this specification.

Prior to blast cleaning, all surfaces shall be inspected and any oil or grease shall be removed by means of solvent cleaning in accordance with SSPC SP1 using water dispersible cleaners. The solvent shall leave no residue.

Surfaces that have been exposed to a marine or polluted atmosphere shall be fresh water or chemically cleaned to remove any chlorides or other salts to comply with requirements of ISO 8502-6 of less than 20 mg/m² equivalent NaCl.

At the start of each shift, after the compressor has reached operating temperature, the compressed air shall be checked for oil and water contamination in accordance with ASTM D4285

Using dry blasting techniques, the surfaces to be coated shall be abrasive blast cleaned to remove all mill scale and other impurities from the steel surface.

Blast cleaning abrasive shall be of the expendable type approved by Corrosion Engineer. Compressed blasting air shall be clean, dry and free from oil.

The air temperature, humidity, and pipe temperature shall be measured and recorded.

The surface of the pipe shall be blast cleaned as per ISO 8501-1 to Grade **Sa 3** surface preparation quality at the time of coating.

The abrasive material shall be selected to achieve a surface profile of a minimum of 50 µm and a maximum of 100 µm, and as qualified during PQT. Hardness of the abrasive material must be Rockwell C 54 or greater.

The abrasive material shall be dry, clean, and free from contamination.

Salt contamination tests shall be regularly performed on abrasive to verify that total salt level in the soluble contaminants is less than 25ppm.

The method of measurement shall be by an electronic stylus rugosity-type device during qualification to assess profile height and profile density and correlate this with Testex replica tape.

The agreed standard of surface cleanliness and profile height and density achieved during qualification shall be set as the standard for all coating work.

Spot checks using the electronic stylus rugosity device shall be carried out during production as directed by the Corrosion Engineer.

Measurements shall be made with Testex replica tape in accordance with NACE RP0287.

Any loose dust or contamination from the blasting process shall be removed by use of dry clean compressed air, brush, or vacuum cleaner.

The surface of the joint area shall be checked for dust contamination in accordance with ISO 8502-3. The joint surface shall have a dust rating of ≤ 2

Visual Inspection of Cleaned Surfaces

The Corrosion Engineer shall have final approval on the disposition of pipes, bends, specials and fittings whether or not to release those items for coating, to return for re-cleaning, or to reject the item(s) for excessive surface defects.

Surface Defects

After blast cleaning, the items shall be thoroughly inspected for surface defects such as raised slivers, laminations, or hackles of steel visible on the surface.

The defects shall be removed in accordance with the project requirements.

Items formed from pipe with surface defects, which are considered to require extensive grinding, shall be removed from the production process for further investigation.

Extensive grinding shall not be performed without a certified Engineer approval. Anchor pattern shall be restored on all ground surfaces.

Wall Thickness

After extensive grinding, which must be approved, the remaining wall thickness shall be measured by ultrasonic inspection and shall not be less than the specified minimum wall thickness.

Items formed from pipe with thickness less than the specified minimum wall thickness shall be rejected. Ground areas shall merge smoothly with the surrounding pipe surface.

Elapsed Time until Coating

The total allowable elapsed time between completion of the blast cleaning operation and commencement of the coating operation shall be kept to a minimum such that the surface cleanliness is **Sa 3** at the time of coating.

Delay shall not exceed the times provided in Table 1 below.

Table 1

Time-Humidity Table for Blasting – Coating delay

% RELATIVE HUMIDITY	ELAPSED TIME (HOURS)
85	0.5
80	1.0
70	1.5
60	1.75
50	2.0

Relative humidity and dew point temperature shall be determined using a sling psychrometer or digital hygrometer in the immediate vicinity of the abrasive blast cleaning equipment.

No surface preparation by abrasive blast cleaning or coating application is to be performed unless the RH < 85% and surface temperature is more than 3°C above the Dew Point.

Coating Application

All coating activities shall be performed in accordance with the approved procedures.

The surface shall be heated using an induction heating coil, radiant heaters or hot air to a temperature as recommended by the coating material manufacturer and in accordance with this specification

The use of propane torches or gas burners for pre-heating and post-heating is expressly prohibited. Infrared heaters may be used for post-heating.

The temperature of the bare steel shall be monitored using temperature-indicating crayons.

The amount of crayon used shall be the minimum amount required for accurate measurement.

Crayon markings shall be removed with a wire brush.

Care shall be taken to ensure a uniform heating pattern.

Liquid Coating Application

A layer of liquid coating shall be applied to the blast cleaned surfaces using the method and equipment recommended by the product manufacturer. 100% Solid material should have a dry film thickness (DFT) of 600µm and shall be a minimum of 500µm. A maximum of 800µm will be allowed for the total system.

Note the manufacturer's specifications must always be cross referenced to ensure the total system is achievable whilst remaining within the listed tolerances for the system.

The required minimum dry film thickness in terms of SSPC PA2 is 1.7mm for the external coating.

100% Solid materials must be applied in one single application. The specified thickness shall be achieved in one application for solvent free epoxies. In the event of the thickness being less than the minimum specified, the lining shall be removed and the pipe length shall be re-blasted and relined to comply with the specification. For factory-coated pipe, bends and specials the cut back shall be 150 ±20mm. The edge of the cut-back shall be feathered at 30 – 45°.

The coating shall be uniform, free of defects and shall not show a tendency to laminate, to sag or to curtain.

If post-heating of the coating after application is required, this shall also be carried out in accordance with the product manufacturer's procedure, and as qualified during Quality Control Planning phase.

The wet film thickness shall be measured in accordance with ISO 2808.

Particular attention shall be paid to the recommended dry film thickness which shall be measured in accordance with SSPC PA 2.

No spot measurement may be less than 1.5mm for the polyurethane and 500µm for the epoxy.

No thinner shall be used unless recommended by the product manufacturer.

Tools and equipment shall be cleaned using only such solvents as are recommended by the product manufacturer.

Particular care shall be taken in the handling of the coated items before the coating has reached the minimum value of hardness recommended by the manufacturer and qualified during the rock impact test.

All pipes and other components shall be high spark holiday tested in accordance with NACE RP0274 at the test voltage recommended by the coating manufacturer.

Repairs

Repairs shall be carried out with repair grade materials of the same grade as the spray-applied, and tested in accordance with approved procedures.

Data and Quality Requirements

Table 2:

Data Requirements for System Pre-Qualification Additional to BS EN 10290, Section 3, Table 1

PROPERTY	TEST METHOD	ACCEPTANCE CRITERIA
Hardness Shore "D"	ASTM D2240	≥75
Composition	FTIR Fingerprint	
Contractor shall submit data regarding specific curing times to touch dry, dry to handle and full cure for steel temperatures of 10, 20, 30, 40 & 50°C		

(Note: The coating is equivalent to type 1 thickness class B of BS EN 10290 clause 1)

Table 3:

Requirements for Procedure Qualification Additional to BS EN 10290, Section 7, Table 4

PROPERTY	TEST METHOD	ACCEPTANCE CRITERIA
Cathodic disbondment, 66 ± 3°C, 24 hrs, 3.5V	NACE RP 0394	<6mm
Adhesion to steel after hot water soak, 70 ±3°C, 30 days and 60 days	ISO 4624	≥7MPa
Impact resistance	ASTM G14, 23°C	3J/mm
Interface porosity	NACE RP 0394	1-2
Cross section porosity	NACE RP 0394	1-2

Table 4:

Requirements for Quality Control Testing From BS EN 10290, Section 8, Table 5 and or this Specification

Properties
Surface condition before blast cleaning
Dimension, shape and properties of blast cleaning products and checking of the blast cleaning process
Abrasive salt levels
Roughness of the blast cleaned surface
Visual condition of the blast cleaned surface
Temperature of pre-heating, before coating, if necessary
Temperature of post-heating, after coating, if necessary
Temperature and humidity
Wet thickness of the coating system
Dry thickness of the coating system
Appearance and continuity
Holiday detection
Hardness Shore "D"
Infrared scan, check against manufacturer's data
Adhesion test - Pull off method (1)
Cut back (factory-coated items)

Note 1:

Field pull-off adhesion testing shall be carried out on an offline spool or adjacent to the cut-back on production pipe, every shift.

Publications

The following publications form part of this specification. Unless otherwise specified herein, the latest edition as at the date of this specification shall apply.

ASTM–American Society for Testing and Materials

ASTM D2240	Standard Test Method for Rubber Property (Durometer Hardness)
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM G14	Standard test method for impact resistance of pipeline coatings (Falling Weight Test)
ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air

BS EN–British Standard European Norm

BS EN 10290	Steel tubes and fittings for onshore and offshore pipelines – External liquid applied polyurethane and polyurethane-modified coatings

ISO–International Organization for Standardization

ISO 1514	Paints and varnishes -- Standard panels for testing
ISO 2808	Paints and varnishes – Determination of film thickness
ISO 4624	Paints and varnishes – Pull off test for adhesion
ISO 8501-1	Preparation of Steel Substrates Before Application of Paints and Related Products - Visual Assessment of Surface Cleanliness - Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates After Overall Removal of Previous Coatings
ISO 8502	Preparation of steel substrates before application of paints and related products - Tests for the assessment of surface cleanliness
ISO 8503	Preparation of Steel Substrates Before Application of Paints and Related Products - Surface Roughness Characteristics of Blast-Cleaned Steel Substrates Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces. Part 2: Method of grading of surface profile of abrasive blast-cleaned steel-comparator procedure. Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile - Stylus instrument procedure. Part 5: Replica tape method for the determination of surface profile.
ISO 8504-2	Preparation of Steel Substrates Before Application of Paints and Related Products - Surface Preparation Methods - Part 2: Abrasive Blast Cleaning

ISO 11124-1	Preparation of Steel Substrates Before Application of Paints and Related Products - Specifications for Metallic Blast Cleaning Abrasives- Part 1: General introduction and classification Part 2: Chilled iron grit Part 3: High-carbon cast-steel shot and grit Part 4: Low-carbon cast-steel shot

NACE - National Association of Corrosion Engineers

NACE RP0274	High-Voltage Electrical Inspection of Pipeline Coatings Prior to Installation
NACE RP0287	Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape
NACE SP0394	Application, Performance, and Quality Control of. Plant-Applied, Fusion-Bonded Epoxy External Pipe

SSPC–Steel Structures Painting Council

SSPC SP11	Power Tool Cleaning to Bare Metal
SSPC PA 2	Measurement of Dry Coating Thickness with Magnetic Gauges (Steel Structures Painting Manual, Ch 5 - Paint Application Specs.)
SSPC SP1	Solvent Cleaning

South African Bureau of Standards

SANS 1217	Internal and External Organic Coating Protection for Buried Steel Pipelines
SANS 241	Drinking water

PORTION C: PARTICULAR PROJECT SPECIFICATIONS

SECTION Y: SPECIFICATION FOR BRICKFORCE BOUNDARY WALL

PSY BRICKLAYER

PSY 1. SCOPE

This Section of specification covers all aspects of brickwork including building of various items, reinforcing of brickwork, as well as the supply of all material and labour.

PSY 2. MATERIALS

PSY2.1 Standards

All materials used shall comply with the following standard specifications, the latest of which shall be held to apply:

SABS 28 Metal ties for cavity walls

SABS 227 Burnt clay masonry units

SABS 471 Portland cement

SABS 626 Portland blast-furnace cement

SABS 831 Portland cement 15 and rapid-hardening Portland cement 15

BS 1200 Sand for plaster and mortar Concrete Masonry Assoc: The Masonry Manual

PSY 2.2 Masonry Units

PSY 2.2.1 General

Bricks shall be free from cracks, chips or other defects and at least one end of 20% of the bricks shall have the same general colour and texture as the faces.

Special care shall be exercised in loading, stacking and handling face bricks as no damaged bricks shall be used and bats may only be used where required to obtain bond.

General-purpose stock bricks or common bricks shall have a minimum average compressive strength of 10MPa unless otherwise specified, while for facebrick a minimum average compressive strength of 15MPa.

Facing bricks shall be of the type, origin and colour specified in the Schedule of Quantities or on the drawings and shall be selected for uniformity of dimension and colour.

Satisfactory proof of load bearing capacity of bricks offered shall be submitted before deliveries are made to the site. For samples, 6 units of each type of brick shall be submitted to the Engineer for approval. All subsequent deliveries shall be to the standard of the approved samples. All bricks which,

in the opinion of the Engineer, do not comply with the abovementioned requirements, shall be removed from the site forthwith at the Contractor's cost.

PSY 2.2.2. Burnt Clay Bricks

Burnt clay bricks shall comply with SABS 227:2007 and SANS 1 575:2007:

Engineering bricks shall be of high compressive strength and durability, with 15 MPa minimum average compressive strength and selected for their uniformity of dimension and shape. Bricks shall be clay and pressed or wire cut. Water absorption after a 24-hour test shall not exceed 12% by mass.

Facing bricks shall have a minimum average compressive strength of 15 MPa. Bricks shall be clay and pressed to wire cut. Water absorption after a 24-hour test shall not exceed 12% by mass. Bricks shall have sharp, clean and well defined arises.

General purpose stock bricks or common bricks suitable for general building work shall be clay, pressed or wire cut, even in size, smooth in texture and with sharp well defined arises. Water absorption after a 24-hour test shall not exceed 14% by mass.

PSY 2.3 Cement

Cement used in masonry shall comply with the requirements of SABS 471, SABS 626 and SABS 831.

PSY 2.4 Fine Aggregate (Sand)

Fine aggregates used in mortar shall be naturally occurring sand or consist of crushed rock or gravel, or a combination thereof with naturally occurring sand being hard, clean and free from dust, shale, clay, loam roots and other impurities.

The meter shall offer lifetime stable zero so that routine zeroing is not required. The meter shall automatically indicate zero flow under empty pipe sensor conditions.

PSY 2.5 Mortar

Mortar shall unless otherwise specified, be Class I mortar and shall consist of 1-part Portland cement, $\frac{1}{4}$ part hydrated lime and 4 parts sand. The ingredients shall be measured in proper gauge boxes on a timber or steel-mixing platform with water added and thoroughly mixed in to obtain a uniform consistency throughout. Alternatively, mixing may be by means of an approved mechanical batch mixer.

In the case of a cement-milled slag mortar, the sand and slag shall be mixed first and then the cement added.

Cement mortar shall be used within two hours of the first contact of the cement with water. No mortar which is older than two hours or has begun to set shall be used.

PSY 2.6 Wall Ties

Metal wall ties in brickwork and blockwork shall be galvanised crimped steel, single wire type, 4 mm diameter minimum, complying in all respects with SABS 28.

PSY 2.7 Concrete to Brickwork Ties

End of junctions of brick walling to concrete are to be tied to the concrete by means of 1.6 x 32 x 500 mm galvanised hoop iron ties. Brick linings to concrete are to be tied with 4 mm diameter crimped galvanised wire ties to SABS 28.

PSY 2.8 Storage of Materials

Cement and aggregates shall be stored in such a manner as to prevent deterioration or contamination by foreign matter, damp and chemicals spilled on the ground or which may settle out of the atmosphere.

PSY 3. EQUIPMENT

The Contractor shall provide and maintain in good working order, adequate equipment for carrying out the required work in accordance with this specification in a safe efficient manner.

PSY 4. CONSTRUCTION

PSY4.1 Brickwork Generally

All brickwork shall be laid in stretcher bond, plumb and true to line. Mortar beds shall be 10 mm thickness, unless otherwise described, and are not to exceed 12 mm in thickness, and no four successive joints shall rise more than 40 mm (for 10 mm joints). Clay bricks are to be well wetted (saturated in hot weather) with water before being laid and the course of bricks laid last shall be well wetted before fresh bricks are bedded upon it. Bricks shall be well buttered and laid on a full bed of mortar and joints shall be flushed up. Bricks in foundation walling are to be extra hard. The tube must be lined with an approved potable water liner - neoprene or hard rubber, which will stand up to the duty and conditions specified. Vacuum conditions must be considered.

The brickwork shall be carried up in a uniform manner, no one section being raised more than 1 200 mm above another section at one time and no brickwork is to be carried more than 4 courses above immediately adjoining or intersecting brickwork. Block bonding or toothed and keyed construction will only be allowed in alterations to existing work.

One-brick walls (230 mm) built stretcher bond in two skins shall be tied together with galvanised wall ties staggered not more than 1 m apart horizontally and every fourth course vertically with extra ties at reveals and openings etc. as may be necessary. Brick linings to concrete walls shall similarly be tied together, while galvanised hoop iron ties cast into concrete columns, shall be built into the joints of butting brick walls as specified. When thoroughly dry the face shall be twice coated with an approved liquid bituminous compound and worked around wire ties to produce an unbroken waterproof coating.

PSY4.2 Reinforced Brickwork

Brickwork over door and window openings shall be reinforced with welded wall reinforcement placed in each course of brickwork over openings for a minimum of 4 courses or as shown on the drawings. Reinforced brickwork shall continue at least one and a half bricks on either side of the opening. Where two or more openings are less than 675 mm apart, the reinforced brick lintels shall be continuous over all such openings and their dividing piers, plus 1½ brick bearing at both extreme ends.

Brick lintels in cavity walls, which are exposed to the weather, shall have a continuous damp-proof bourse built into the outer skin of the wall immediately above the lintel to cover the top of the lintel, raked up one course and carried through the inner skin.

PSY4.3 Face Brickwork

All facings shall be kept clean during the progress of the work and face-brick surfaces with mortar spattering will not be accepted. Unless otherwise specified, the horizontal and vertical joints shall be pointed and finished and both rubbed smooth as the building work proceeds.

The colour of the face bricks shall be selected showing a preponderance of one colour. Where sufficient storage is available on site the full quantity of face bricks required for the works (or such quantity as to keep supply well advanced of construction) shall be delivered to site.

PSY4.4 Fairface Brickwork

Where called for on the drawings and in the Schedule of Quantities, internal walls shall be of smooth stock-bricks, built fair and kept clean during construction and jointed as per drawing JW 14289-220.

Precast Prestressed Concrete Lintels

Approved precast prestressed concrete lintels of suitable size of the thickness of the wall and the width of the opening shall be used over openings in plastered and bagged walls.

Wherever possible, the minimum bearing for precast prestressed lintels, at their ends and over intermediate supports, shall be:

- a) for openings not exceeding 600 mm - $\frac{1}{2}$ brick (110 mm)
- b) for openings exceeding 600 mm - 1 brick (230 mm)

Where this requirement necessitates a total lintel length exceeding 6.6 m, a joint may be introduced centrally over an intermediate pier in a position to be approved by the Engineer. Such joints shall be stiffened by the introduction of welded wall reinforcement as specified in the clause above referencing Reinforced Brickwork. and extending a minimum of 300 mm on either side of the joint, i.e. 600 mm minimum total length.

PSY4.5 Concrete/Brick Ties

At end on junction of brick walls with concrete columns or walls brickwork is to have galvanised hoop iron ties built into the joints for:

- a) $\frac{1}{2}$ brick skin (110mm walls) at maximum 8 course height intervals
- b) 1 brick skin at maximum 4 course height intervals skin only.

Ties are to be cast into concrete at course heights by tacking L-shaped ties to inside face of shutters and bending down ends for building in after shutters are stripped or shot fixed to concrete with approved nails and strength of shot top provide adequate fixing.

Galvanised crimped wire ties for fixing of brick linings to concrete are to be cast a minimum 75 mm deep into concrete at brick course eights (four per square metre staggered), bent down after shutters are stripped and built into brickwork.

PSY 5. TOLERANCES

PSY 5.1 Tolerances

Tolerances for clay brick dimensions, strength, warpage and efflorescence shall be as SABS 227.

PSY 6. TESTING

Compressive Strength

Determination of the minimum average compressive strength of clay bricks shall be in accordance with SABS 227 at frequencies required by the Engineer.

PSY 7. MEASUREMENT AND PAYMENT

PSY 7.1 Brickwork

The unit of measurement shall be square metre (m²).

The unit of measurement for all brickwork shall be the square metre of the specified type and thickness laid.

The rates tendered for ordinary brickwork shall be inclusive of supply of bricks, brickforce, lintels, airbricks, wall ties, damp proof course, mortar and everything necessary to erect the brick work shown on the drawings, and for testing, all plumbing of corners and faces, linings, levelling, ruling of joints, forming reveals and openings, cutting where necessary but not specially scheduled, supply and building in wall plugs, wall ties, etc, hoisting to various levels, soaking all bricks in water before laying, any selecting of face-bricks on site to maintain an even texture when laid and for cleaning down with spirits of salts all facework on completion.

PORTION C: PARTICULAR PROJECT SPECIFICATIONS

SECTION Z: SPECIFICATION FOR SCADA, TELEMETRY AND SOLAR BACKUP POWER SYSTEM

PSZ 1: GENERAL

PSZ 1.1. Materials and Workmanship

All materials and components used in the manufacture and fabrication of equipment to be supplied shall conform to SABS / ISO standards or original equipment manufacturer specifications and shall be new and of the best quality and class suitable for the purpose specified.

PSZ 1.2 Design and Standardisation

All equipment shall be designed and installed to ensure the maximum possible continuity of service occurs, and to facilitate inspection, testing, maintenance, repair and cleaning. Components shall comprise readily obtainable standard items that are ex-local stock.

PSZ 1.3 Environmental Conditions

The incidence of lightning storms during summer is relevant on the Highveld. Atmospheric temperatures vary from below freezing point to more than 40°C. Humidity can also be high and could cause appreciable condensation within equipment not suitably sealed or protected against these conditions. All equipment shall be adequately enclosed, protected, and capable of operating satisfactorily under these conditions.

PSZ 1.4 Layout of Installation

It is imperative that Johannesburg Water maintains a robust modular RTU system. It must be easy to remove, replace and repair any modular unit without opening-up units. All IO, Radio, Power, surge protection and other sub-components shall be self-contained units which shall be easily removable. It shall be easy to expand IO, surge protection, and communication mediums to the RTU i.e. be modular / components.

The outstation must be built with both 20% spare analogues and termination capacity and be housed in Powder Coated cabined such as the Perano 204 for inside and 104 for outside

All wiring shall be contained within conduit or trunking or within metal enclosed equipment. When two or more parallel rows of terminal blocks are used, the clear space between the blocks shall be at least 120 mm.

Where two or more pieces of electrical equipment, in close proximity, have similar signal or supply conditions, the use of a junction box to group the tail cables shall be made in order that a common multi-core cable may be run to the control room.

Cable entries into outdoor junction boxes shall be bottom entry only.

Cables carrying 230 Vac (power or ON/OFF signals) may only be run on the same cable tray as analogue signal cables if the spacing between the cables is at least 100mm, or if individually and overall screened cables are used.

Low voltage signals and power/audio output signals may not be run in the same cable without the permission of JW ESM management.

LV cables shall be laid 600mm and HV cables 1000mm below general ground level. All cables in soil trenches shall be bedded in river sand or sifted ground (no clay) 75mm below and 75mm over the cables before backfilling of excavations.

PSZ 1.5 Installation of Equipment

Equipment shall be mounted for maximum accessibility and visibility. Workmanship shall be of good quality and all cutting, drilling, welding, etc., shall be neatly done. Each completed installation, including supports, brackets and wiring shall present a clean, compact appearance. All fixing hardware for field mounted equipment shall be finished off free from burrs or jagged edges.

PSZ 2. REMOTE TERMINAL UNIT (RTU) AND ASSOCIATED COMPONENTS / FUNCTIONS

RTU shall be an intelligent, modular unit capable of data acquisition, local data processing and control program execution. It shall monitor and control local equipment in a stand-alone mode as well as being an intelligent node in a distributed processing network. It shall be microprocessor based and allow software reconfiguration and optimisation to occur both on-

site and remotely via communication channels. The RTU must be fully backward compatible with the current SSE Maestro 14-way (RTU) in order to operate on the same telemetry communication platform and support open protocol DNP3 as well.

PSZ 2.1 Installation

To facilitate installation, maintenance and future expansion, all Input-Output (IO), Relay modules shall connect to the master processor module. The RTU shall be based on the newest RTU technology and shall also have advanced PLC functionality fully compliant to IEC standards.

The RTU system shall be of modular design. The various components such as CPU, IO Modules, Radios, Power Supplies, and so forth shall be individual components designed in such a way that the individual components can be tested individually and replaced individually.

The RTU shall be supplied and equipped with the number and type of IO points, that are fully compatible with the RTU, and as indicated in the Bill of Quantities / Pricing Schedule. Future expansion shall be possible by simply plugging in additional IO modules.

A RTU design with CPU, IO Modules, radios, surge protection and so forth all integrated in one unit shall NOT be acceptable. The RTU system shall be of a modular design.

PSZ 2.2 RTU Communication mediums

Various communication ports shall be required at various sites. Both to communicate with local IED and backhaul communication to SCADA and peer-to-peer between devices. Refer to the BoQ / Pricing Schedule for the number of Ports required for this project.

PSZ 2.3 Surge Protection

The RTU IOs need to interface with the existing surge protection units as manufactured previously by SSE in order to ensure standardization of the systems within Johannesburg Water occurs. If other suppliers surge protection products are to be used, then the need to be able to be exchangeable and compatible with the surge protection as used on other existing JW outstations in the system. Surge protection inside the telemetry cabinet is an eight channel unit and at the end point at the instrument a 2 channel unit. The earth Protection units must be grounded with earth spikes and have to be connected with bare copper earth wire

PSZ 2.4 Labelling

All marking and labelling standards of Johannesburg Water shall be maintained. The tenderer may, on request, visit another site to view the layout and labelling standard.

PSZ 2.5 Tag Readers / Biometrics

Integrated in the existing telemetry system are Tag / Biometric readers that is used by JW's Engineers, Technicians, and others authorised users to identify themselves when working at the site. This reader must be compatible with and interface with the existing SCADA system for the operators to identify who is on site in the telemetry control room in real-time.

PSZ 2.6 Change of Events

It is important that the system data gathering from the master shall not be primarily based on a round robin polling method, but primarily on Change of State (Eventing) basis. The remote station RTU shall have the ability to report change of state (event) of user configurable IOs. Thus, the remote RTU shall only initiate communication when a data change event occurred which shall be reported to the master station or peer-to-peer to other sites in the system. These event settings shall be user configurable using the Configuration Toolbox at the master station and be downloadable from the master or any other remote site. All events shall be remotely time stamped at the RTU when it occurred within 10 millisecond accuracy.

All Digital inputs dead times shall be individually configurable. Thus, the Engineer/Technicians shall be able to set re-action times on each input which shall trigger an event when such changes occur.

All Analogues input shall also be individually configurable. The sample timings, number of samples, and sampling triggers shall be configurable and downloadable to the remote station from the master station.

PSZ 2.5 Remote Time Stamping

It is important that the remote RTU system supports remote time stamping of events as close as possible to the source of the event. Thus, the RTU Controller shall be equipped with a real-time clock and remotely time stamp all events, change of states and values. All events shall be time stamped within 2 milliseconds accuracy. These events shall then report the new value with the remote time stamp to the master SCADA station.

PSZ 3. COMMUNICATION BACKBONE (DIGITAL RADIO)

The present GE based MDS digital radio platform is used on the existing telemetry outstations. To ensure backwards compatibility to existing communication networks, if new communication equipment is to be offered then it shall be equal or similar to the GE- MDS Orbit Communication System Range.

All radio equipment to be used for the Telemetry System shall be fully ICASA approved. If an alternate to this brand is to be offered, then the tenderer needs to clearly demonstrate their solution in their proposal, and if required present a formal presentation to JW.

PSZ 3.1 General UHF Radio Characteristics

- The device shall operate in the 450-520 MHz narrowband spectrum.
- The device shall support software-enabled frequency selection.
- The device shall support QPSK, 16QAM and 64QAM modulations.
- The device shall support channel sizes of 6.25 KHz, 12.5 KHz and 25 KHz.
- The device shall support Half Duplex/Simplex modes.
- The device shall support CPFSK Digital A-modem for backward-compatible mode connectivity to existing GE MDS SD Series radios.
- The Radio shall operate at over the air data rates from 9600 to 66 KB.sec.
- The radio shall be able to operate in Transparent Mode (Serial Streaming) to natively transport serial data. The radio shall be able to operate in the Packet-with-MAC mode to transport IP data.

Note: Only radio carrier equipment which is approved by the Independent Communications Authority of South Africa (ICASA) for use in the Republic of South Africa in terms of Radio Act, Act 3 of 1952, shall be offered. The contractor shall, on request, provide JW with a copy of the relevant certificate of approval. (Type approval certificate).

PSZ 3.2 Outstation UHF Antennas

Antennas shall comply with the following:

- The outstation shall be equipped with type Webb HD400 heavy duty dipoles (omni directional unity gain antennas), or similar as approved by Johannesburg Water.

- Where higher gain or directionality is required, a 3 element or 7 element Yagi antenna or type Webb Y425/3 or WEB Y425/7 shall be used, or similar as approved by the System Development Manager (also referred to as the Engineer).
- If high a gain antenna is required, such would be indicated in the Price Schedules.
- Antenna earthing will be a “ crow feet configuration “ with earth spics 2 meters apart.

PSZ 3.3 Outstation Antenna Masts

- Where outside masts are required, antenna masts shall be similar and equivalent to a Webb ACP 50 / 3 / 5 and fitted to the side of the building with the necessary offset brackets and mounting hardware. These masts shall be earthed / surge protected. It shall be attempted to mount antennas on the inside of the buildings as far as possible and in such a case, antennas shall be mounted on offset brackets on the inside of the pump station, or other available building.
- The antennas shall be supplied complete with mounting arms, clamps and support. All mounting materials shall be heavy duty galvanized steel or stainless steel or aluminium.

PSZ 4. INSTRUMENTATION / EQUIPMENT SPECIFICATION

PSZ 4.1 Instrumentation

- Johannesburg Water makes use of a wide variety of instrumentation which are to connect to the telemetry, The list below is not exhaustive and only provided as guidance to what may be coupled at the outstation:
 - H2O (Hydrostatic) Pressure Transducer for Level
 - Pressure range 350 mbar to 2.5 barG (3.57mWG to 25mWG)
 - Proof pressure 2 x Full scale (FS)
 - Burst pressure 3 X FS
 - Current Output 4-20mA (2 wire)
 - Supply voltage 10-30Vd.c. (Sensitivity: 0.1%FS/Volt)
 - Max loop resistance (Vs-10) x 50 Ohm
 - Conductivity Probe / Capacitive Sensor for Overflow detection
 - Supply Level Conductivity Probe with Stainless Steel electrodes. Output NO/NC potential free (IP 67 rated) contact
 - Radar Level sensors
 - Model: dBR8 and dBR16
 - Dimensions: Nominal 90mm diam x 130mm height (3.54in x 5.11in)

- Weight: Nominal 1.1kg (2.4lbs)
 - Measurement range: dBR8: 8m (26ft); dBR16: 16m (52.5ft)
 - Frequency: V-band
 - Beam angle: 8°
 - Sensor body material: Valox 357U
 - Cable lengths: Standard: 5m, 10m, 20m or 30m (16.4ft, 32.8ft, 65.6ft or 98.4ft). Optional: up to 150m (492ft) in 10m (32.8ft) increments
 - Maximum separation: 500m (1640ft)
 - Mounting connection: 1" BSP
- Level Switches
 - See conductivity probes
 - Electronic Magnetic Flow meters
 - Where there is an inflow from Rand Water the billing meters will be EMF flow meters
 - Ultrasonic Flow meters
 - Where there is an outflow to the system , then flow meters Ultrasonic Flow meters or Insertion probe meters can be used
- The exact installation positions for the instrumentations required will need to be determined off the drawings and also verified on site. The tenderer will engage with the Engineering Specialist Technicians (ESTs) of JW or the JW Systems Development Manager to ensure the quantity, types and parameters / technical specifications of the instruments or equipment to be procured are of the same accuracy and reliability of the existing instruments or better.

PSZ 4.2 Warranty

The tenderer will be required to provide a back-to-back warranty to that of the supplier (OEM / Agent) for these instruments or equipment procured in this method. However, Instruments sourced through the contract must hold at least a twelve (12) month warranty.

PSZ 5. OUTSTATION EARTHING & CABLING SPECIFICATION

PSZ 5.1 Outstation Earthing

- All outstations shall be earthed in accordance with the Standard Specification. Mast down conductors shall be 25 x 1.6mm galvanised steel.

- An earth bar with at least 5 connections will installed inside the telemetry hut and all earth wires will be connected to the earth bar including instrumentation, antenna, telemetry .
- An additional 10mm² copper cable shall be installed between Telemetry box and instrumentation junction boxes.

PSZ 5.2 Outstation Cabling

- RF cabling shall be RG214 or similar. All cabling shall be neatly run inside the masts and be supported with UV stable cable ties.
- All I/O wiring at the outstation shall be done with screened twisted pair wiring of 0,5mm² minimum, conductor area. Single core wiring shall not be used. All wiring to be neatly routed in plastic slotted ducting with snap on covers. All wiring shall be marked and numbered to correspond with the information on as-built drawings, to be prepared as part of this Contract.
- Tenderers shall allow for a 5m length of ducting, in their price calculations.
- It can be assumed that the existing I/O status outputs shall be made available on a marked terminal strip, within 5m of the telemetry outstation position. Wiring between these terminals and the outstation terminals, shall form part of this contract.
- All instrumentation cable shall be 12 Core multi strain 0.5mm oval screened with extra neutral wire. Lugs / Ferrules on all cables and all cables shall be clearly marked as per drawing. All surface conduits, fittings and bends shall be at least 20mm galvanized.

PSZ 5.3 Trenching

- All trenches shall be at least 400mm deep, with a minimum of two off 50mm sleeving.
- A bare copper cable will be installed outside the sleeving with earth spikes on both ends
- Not more than 3 cables per sleeve is permitted.
- Instrumentation cable and power cable higher than 24V are not allowed in the same sleeve.
- All sleeves must have at least one draw wire per sleeve.
- Every 20-25 metres there shall be a cable inspection box
- Only soft sand on cable, no rocks in trenches.
- Cable indicators on cable.

PSZ 5.4 Cable Numbering and Marking

- The Contractor shall produce a cable schedule from which all cable identification numbers shall be derived.
- Cables shall be labelled with the cable number at the origin and destination points and at entries/exits to racking/ducting/penetrations, by means of a label, approved by the Systems Development Manager, suitably attached to the cable.
- The cable marking label shall be finished with a “fit-for-purpose” plastic sleeve, approved by the Systems Development Manager, suitably attached to the cable

PSZ 5.5 Field Boxes Numbering and Marking

- The Contractor shall produce a “junction box / panel schedule” from where all field-mounted box identification numbers shall be derived.
- Field boxes shall be identified by means of an engraved label.
- Environmental suitable label holders shall be used such that labels can be removed without damage to the box.
- Attachment of label holders shall not degrade the IP rating of the box
- The box identification plate shall specify, where applicable, the following:
 - Panel Number
 - Equipment / Panel Service
 - Network / Control Systems Unique Identification

PSZ 5.6 Cable Core Marking

- A wire marking systems shall be used to identify all cables cores at both ends in accordance with the wiring diagrams.

PSZ 5.7 Screening and Earthing

- Sensors cable screen conductors, used for grounding unwanted signal noise, shall be terminated to an isolated signal earth bar (instrument earth) located in the PLC / Control / MCC Panel or Remote IO Panels. An isolated earth bar is an earth bar that is isolated from the safety earth and connected to generation origin earth.
- Individual and overall screen wires of all sensors cables shall be terminated at the equipment room side only and shall be left disconnected (floating) and insulated at the instrument in the field.
- All single pair cable screen conductors shall be insulated and tied back at the sensor.

- Analogue single pair cable screen conductors shall be connected to individual terminals in a junction box.
- Overall analogue cable screen conductors and digital cable screen shall be insulated and tied back inside the junction box.
- Under no circumstances shall the screen conductors be utilised for any other purposes than for noise immunity.
- The safety earth (or electrical earth) shall be utilised for the safety earthing of all metal automation equipment and supports.

PSZ 5.8 Field Mounted Boxes

- All C&I panel's degree of protection shall be suitable for environmental conditions of installation according to IEC 529 and EN 60529 (1991). Control / PLC / MCC panels shall be epoxy coated mild steel or other material as dictated by the installation environmental conditions and specifications.
- Door handle shall be suitable for padlocking.
- The box shall be numbered.
- All digital signal wiring shall be SABS Approved stranded, minimum 0.75mm, 200V grade PVC insulated conductors.
- All power wiring, including neutral wiring shall be SABS approved stranded, minimum 1mm, 600v grade PVC insulated copper conductors.
- All data wiring shall be SABS approved stranded, minimum 0.22mm, tinned copper cores, twisted pair, screened cable.
- All analogue signal wiring shall be SABS approved stranded, minimum 0.75mm, 200V grade PVC insulated tinned copper cores, twisted pair, screened cable.
- DC Power shall be fused on the positive leg by appropriate fuse.
- AC Power shall be circuit breaker protected on Live and Neutral legs
- All Conductor Terminal blocks/rails shall be clearly identified
- Notwithstanding the above, the cross-sectional area of all wiring cores shall be calculated to "fit-for purpose".
- All wires shall be supported in PVC trunking to hold all conductors running horizontally and vertically, Trunking shall be sized so that it is at no stage more than 80% full.
- Where wires travel from fixed to moveable locations, for example from a chassis to a hinged door, the wires shall be bunched together and harnessed by PVC spiral

wrapping or braided polyamide sleeving. Harnesses shall be secured on the fixed and moveable section.

- Conductors shall be connected by means of single terminal connector blocks only.
- Double / Triple stack terminal connector build-form shall not be used.
- No ferruled, taped or similar joints shall be made in connecting any conductors.
- Cable and wire marking systems shall be used to identify all cable cores at both ends in accordance with the wiring diagrams. The markers shall be white with black. The markers shall fit securely, without sliding, over the cable core insulation.
- Where cable cores pass through metal holes, suitable non-flammable grommets shall be provided.
- Only crimped connector/lugs shall be used. Soldered lugs shall not be accepted. Crimping tools shall be of a type approved by the connector/lug manufacturer.
- DIN rail mounted components shall be used wherever possible.
- All components shall be so fixed that they may be removed and replaced without the aid of special tools. Only fasteners with metric threads shall be used.
- Lightweight components shall be mounted on the chassis plate by means of holes directly drilled and tapped into the chassis. Galvanised or cadmium plated steel screws shall be used.
- Heavyweight components shall be mounted on the chassis plait or cubicle framework either by means of studs welded direct to the chassis or frame, or by means of suitable self-gripping hand bushes with cadmium plated nuts and washers.
- Care shall be taken to ensure that instruments and components are rigidly supported and not susceptible to shock or vibration.

PSZ 5.9 Cables and Cable Cores

- All cables shall comply with the relevant SANS specification for the cable application.
- Outer insulation material of cables for in confined spaces shall be fire retardant, non-toxic and Halogen free.
- All cables shall be tested prior to delivery to site. The tests shall establish that the cables dielectric is sound, that all cores are continuous from end to end, and it complies with the cables schedule details and manufacture specifications.
- The cross-sectional area of all cable's cores shall be calculated to be "fit for purpose".
- Unused or spare cables cores shall be strapped together with cable straps should they not be connected to spare terminals.

- The length of spares cores shall exceed the length of the longest used core.
- Consistency in the use of core colours and/or numbers shall be maintained throughout the installation to avoid confusion.
- Colour and/or number coding of cores shall be shown on the relevant drawings.
- Cores passing through holes in chassis or screens shall be fully protected by fitted grommets or bushes.
- Cores carried across a hinged portion of a chassis or door shall be flexible. Sufficient slack shall be provided to obviate tension.
- The insulation of a core shall not be stripped back further than or less than necessary. The conductor shall not be exposed with a crimped insulated terminal lug fitted.
- Not more than one core shall be connected to one side of a connection terminal block.
- Core terminations shall be fitted with interlocking engraved (black letters on white background) plastic cable ferrules, reference numbered to correspond with the related schematic or wiring diagrams. Split or clip-on ferrules or adhesive marking tapes are not acceptable. The marking for horizontal runs shall be from left to right when facing them, and for vertical runs from the bottom upwards.
- The wiring inside panels and junction boxes shall be well planned and neatly arranged in the best possible manner, allowing for forming of cores so that there is no strain on them

PSZ 5.10 Signal Cable Installation

- Cables shall be installed neatly, either saddled or strapped to the panel or supporting steelwork. Where there is not possible or practical, the cable loom shall be strapped together using proprietary type plastic cable available for this purpose. Cotton insulation or thread shall not be used.
- Cables shall be secured and connected at terminations to prevent undue mechanical stresses upon glands, conductors or terminals.
- Signal and communication cables shall be segregated and separated from power cables on separate racking, parallel routes shall be separated by a minimum distance of at least 300mm, space permitting and if physically possible.
- Cables shall not be installed double banked on racks.
- Armoured cables shall be secured to racks or angle-iron supports by 10mm wide stainless-steel strapping and purpose-made buckles.
- Unarmoured cables shall be secured to racks or supports by fit for purpose PVC or nylon.

- The span of strapping shall be such as to prevent bunching of cables, and in any event, should not exceed 1000mm
- Cables running horizontally on cable racks mounted vertically(edgewise)shall be secured to cables racks at 60mm intervals, which shall be reduced as necessary to prevent unsightly sagging of cables.
- Cables laid flat in racks parallel with a slightly inclined ground or floor surfaces need not be secured to the racks more often than is necessary to prevent cables from moving because of expansion, contraction or vibration.
- Any horizontal or vertical cable run that are not strapped or supported in such a way that the cable cannot fall in the event of fire shall be strapped by 10mm wide stainless-steel strapping and purposes-made buckles at 1 metre intervals.
- Holes for cables passing through panel steelwork shall be made smooth or bushed to prevent severing of the cable and fitted with appropriate grommets.
- Joints in cable are prohibited unless the route lengths exceed the maximum lengths the manufacturer can supply. In this eventually, approved proprietary types of junction boxes shall be used. Joints shall only be used the approval from the Employer.
- When stripping insulation from cores, the conductors shall not be nicked or cut.
- All conductors shall be terminated in an insulated double crimped termination lug of the correct size using a crimping tool approved by the manufacturer of the terminal.
- Bare conductor terminations shall not be accepted.
- Pin lugs shall be used for connections using terminal strips and spade lugs when terminating under a screw head.
- Holes into air-conditioned rooms shall be completely sealed off to maintain the air conditioning system performance.
- Cables screens at the unearthed end of the cable are to be tied back and covered with heat shrink sleeve. Cable screens shall not be cut off at the cable sheath.
- Cables shall enter an enclosure from the bottom and shall be formed to relieve stress on the cable end, with a sealing boot fitted over the cable gland.
- Cables to instruments shall be terminated in a locally mounted approved IP65 connection box with a short length of flexible cable with a single 150mm diameter loop strapped to a suitably supported angle iron.

- The connection box can be multiple-way units to accommodate more than one loop, provided the loops are associated. A terminal strip shall be fitted inside the box for core connections
- Sealing boots shall cover the cable glands fitted to connection boxes.

PSZ 6. SCADA

- Define Tags (I/O)
- Create I/O in OPC and SCADA
- Create Programs in OPC
- Graphic Forms a per JHB Specifications
- Faceplates
- Generator Graphic Forms and interface
- Logging to SQL
- Trending
- Alarming
- ASI- reports
- Data Warehousing\
- Detail Mimics
- Region Mimic
- Update Script programs
- Detail Maps
- Overview Mimics

PSZ 6.1 I/O List

(a) Digital

Mains Failed	DIN 1
Telemetry Hut Door 01 Alarm	DIN 2
Fairland Telemetry Tamper Alarm	DIN 3
Reserved Counter	DIN 4
Reserved Counter	DIN 5
Telemetry Tamper Alarm	DIN 6
Passive Detector (Internal)	DIN 7
Intruder Alarm Enable/Disabled	DIN 40
Passive Detector	DIN 70

(b) Analogs

Description	I/O	EU MAX
Fairland Battery Voltage 12V	AIN 1	
Fairland Reservoir Level 01 Submersible	AIN 2	
Fairland Res Inflow 01 R01-IN-01	AIN 3	
Fairland Res Outflow 01 R01-OUT-01	AIN 4	
Fairland Reservoir Level 01 Ultrasonic	AIN 5	
Fairland Battery Voltage 24 V Metering	AIN 6	

BOQ Telemetry Outstation

TELEMETRY OUTSTATION BASED ON 16 DIN /16 AIN / 16 DOU				
ITEM	Telemetry Panel	QTY	Unit Price	Total Price
1.1	DIN rail mounted Power Supply 10A 12 V	1		R0.00
1.2	Maestro 2500 CPU12 With ASC1 14 Way	1		R0.00
1.3	Maestro 8-Multi I/O Module 14 Way	1		R0.00
1.4	RS 232 Multiplexer 8 Channel	1		R0.00
1.5	ICP Con 485 Convertor	1		R0.00
1.6	8 Channel Differential input without battery monitoring	2		R0.00
1.7	Surge Protection non-isolated 8 channel	1		R0.00
1.8	8-way buffer unit	1		R0.00
1.9	Fused Power Distribution Board	1		R0.00
2.0	12V DC to 24V DC Converter unit 5A	1		R0.00
2.1	220VAC Mains Surge Arrestor	1		R0.00
2.2	220V Circuit Breaker	1		R0.00
2.3	Intruder Switch (MICRO SWITCH LOW TORQUE WIRE LEVER 1C/O 5A)	1		R0.00
2.4	Perano Enclosure 205G – Indoor	1		R0.00
2.5	GE MDS Orbit ECR radio (406-470 MHz)	1		R0.00
2.6	Panel Manufacturing and testing	1		R0.00
	Junction box consists of	QTY		QTY
2.1	Perano Enclosure 204G – Indoor	1		R0.00
2.2	Panel build up and testing	1		R0.00
	Battery box consists of	QTY		QTY
3.1	Perano Enclosure 204G – Indoor	1		R0.00
3.2	Lithium Battery 100AH 12V	1		R0.00
3.3	Panel build up and testing	1		R0.00
Access control consists of		QTY		QTY
4.1	Tag Reader (TRD A3)	1		R0.00
4.2	PIR (Microwave and infrared)	1		R0.00
4.3	Siren 2 Hole Sound Bomb	1		R0.00
4.4	Magnetic door switch	1		R0.00
4.5	Sundries (cable, cable tray)	1		R0.00
	Antenna kit consists of	QTY		QTY
5.1	Folded Dipole UHF 440MHz HD 440	1		R0.00
5.2	Coax Pigtail RG58, 0.5m, TNC Male to N-Type Male	1		R0.00
5.3	Foam Low Loss - LMR400 (meters)	1		R0.00
5.4	RF Connectors N-Type Male	2		R0.00
5.5	Lipro N Type Surge Bracket Included	1		R0.00
5.6	Wall Mount Bracket - WM45	1		R0.00

5.7	Galvanized mast 50mm x 2mm x 6m	1		R0.00
5.8	Comprehensive Earth Kit (20mx70mm ² , 10mx10mm ² , 5x1.2m Spikes, 5 off Earth Clamp & Lugs)	1		R0.00
5.9	Earth Bar 300mm with 5 Holes and brass Bolts and Nuts	1		R0.00
5.1	Sundries (cable, cable tray, rawl bolts)	1		R0.00
	Preliminary & General consists of	QTY		QTY
6.1	Project Management (hours)	16		R0.00
6.2	Installation Labour (hours)	24		R0.00
6.3	Test & Commission (hours)	8		R0.00
6.4	Travel	500		R0.00
6.5	SCADA and OPC configuration and commissioning (hours)	48		R0.00
6.6	SCADA / Alarm Management configuration a(hours)	48		R0.00
6.7	SCADA and Reporting and commissioning (hours)	48		R0.00
6.8	Drawings and Documentation / Manuals	48		R0.00
TOTAL				

BOQ PV SOLAR INVERTER WITH BATTERY BANK

Item	on	Descripti	Units	QTY	Unit Price	Total Price
1	Main Solar Distribution Board					
1.1	3CR12 Powder Coated Distribution Board Including AC & DC DBs	No.	1	R	-	R -
1.2	Compatible with Sunsynk 5kVA Inverter	No.	1	R	-	R -
1.3	125A 2P DC Fuse Holder & 125Amp Fuses	No.	1	R	-	R -
1.4	Solar panel larger or equal to 450W	No.	8	R	-	R -
1.5	Stand for Solar Panel Mounting on top of Reservoir (Anti-theft)	Sum	1	R	-	R -
1.6	5kWH C1 Rated Lithium Batteries (Rackmount)	No.	2	R	-	R -
				R	-	
2	Telemetry Hut Distribution Board (230V)					
2.1	Industrial Type Surface Distribution Board 12-way	No.	1	R	-	R -
				R	-	
3	Bunker					
3.1	Outdoor Vandal Resistant Steel Enclosure	No.	1	R	-	R -
3.2	Complete Chassis	Sum	1	R	-	R -
3.3	24v DC Power Supply	No.	1	R	-	R -
3.4	DC Surge Arrestor	No.	8	R	-	R -
3.5	Signal Surge Arrestors	No.	4	R	-	R -
				R	-	
4	Cables & wires					
4.1	KBE Solar cable 6mm ² red	m	25	R	-	R -

4.2	KBE Solar cable 6mm ² black	m	25	R	-	R	-
4.3	10mm ² x 3 core Cu PVC SWA Cable (Telemetry Hut)	m	180	R	-	R	-
4.4	4mm ² x 3 core Cu PVC SWA Cable (Guard House)	m	100	R	-	R	-
4.5	2.5mm ² x 3 core Cu PVC SWA PVC cable (Clamp on Flow Meter)	m	50	R	-	R	-
4.6	1mm ² x 1pr Cu PVC SWA Cable (Clamp on Flow Meter)	m	50	R	-	R	-
4.7	2.5mm ² x 3 core Cu PVC SWA PVC cable (Magflow Flow Meter)	m	50	R	-	R	-
4.8	1mm ² x 1pr Cu PVC SWA Cable (Magflow Flow Meter)	m	50	R	-	R	-
4.9	1mm ² x 2pr Cu PVC SWA Cable (Hydrostatic Level Transmitter)	m	120	R	-	R	-
4.10	1mm ² x 2pr Cu PVC SWA Cable (Radar Level Transmitter)	m	120	R	-	R	-
4.11	1mm ² x 16pr Cu PVC SWA Cable	m	155	R	-	R	-
5	Cable ends						
5.1	KBE Solar cable 6mm ² red MC4	No.	4	R	-	R	-
5.2	KBE Solar cable 6mm ² black MC4	No.	4	R	-	R	-
5.3	10mm ² x 3 core Cu PVC SWA PVC cable	No.	2	R	-	R	-
5.4	4mm ² x 3 core Cu PVC SWA PVC cable	No.	2	R	-	R	-
5.5	2.5mm ² x 3 core Cu PVC SWA PVC cable	No.	4	R	-	R	-
5.6	1mm ² x 1pr Cu PVC SWA Cable	No.	6	R	-	R	-
5.7	1mm ² x 2pr Cu PVC SWA Cable	No.	12	R	-	R	-
5.8	1mm ² x 16pr Cu PVC SWA Cable	No.	12	R	-	R	-
6	Small power & Lighting						
6.1	22W LED Vapourproof Light Fittings equal and similar to C10 Lascon	No.	2	R	-	R	-
6.2	34W LED Bulkhead Light Fitting equal and similar to B40-Lascon	No.	7	R	-	R	-
6.3	USB phone charger	No.	1	R	-	R	-
6.4	Industrial light switch and enclosure to Johannesburg Water Specification	No.	3	R	-	R	-
6.5	Light point	No.	10	R	-	R	-
6.6	Light switch point	No.	3	R	-	R	-
6.7	Phone charger point	No.	1	R	-	R	-
6.8	20w LED flood light on reservoir	No.	1	R	-	R	-
7	INSTRUMENTATION						
7.1	Hydrostatic level	No.	1	R	-	R	-
7.2	Radar level transmitter	No.	1	R	-	R	-
7.3	Clamp on flow meter	No.	1	R	-	R	-
7.4	Magflow flow meter meter	No.	1	R	-	R	-
7.5	Vented radar level sensor support system	No.	1	R	-	R	-
8	TELEMETRY						
8.1	Radio System equal and similar to Johannesburg Water Specification	Sum	1	R	-	R	-
					-		

10	CABLE SUPPORTS					
10.1	100mm Galvanised Pipe with Hanger Bolts	m	12	R	-	R -
10.2	25mm ² gals. conduit	m	32	R	-	R -
10.3	25mm ² gals. Hospital saddles	No.	32	R	-	R -
10.4	25mm ² gals. Round Boxes	No.	12	R	-	R -
11	EXCAVATION					
11.1	Pickable Soil	m ³	80	R	-	R -
11.2	Soft Rock	m ³	20	R	-	R -
11.3	Hard Rock	m ³	10	R	-	R -
11.4	Importation of Soil	m ³	30	R	-	R -
11.5	Cable Beneath Tape	m	50	R	-	R -
11.6	Cable Route Markers	No.	20	R	-	R -
12	CORE DRILLING					
12.1	110mm Hole	No.	1	R	-	R -
13	MISCELLANEOUS					
13.1	CCG Boxes No.0	No.	12	R	-	R -
13.2	24V Power Supply Unit	No.	1	R	-	R -
13.3	Fuses and Fuse Holder	No.	2	R	-	R -
16	P+G's					
16.10	Fixed					
16.11	Contractual Obligations	Sum	1	R	-	R -
16.12	Manuals	Sum	1	R	-	R -
16.20	Time Related					
16.21	Contractual Obligations	Sum	1	R	-	R -
16.22	Travel	Sum	1	R	-	R -
16.23	Company Overhead Costs	Sum	1	R	-	R -
16.24	OSHS	Sum	1	R	-	R -
17.0	Commissioning	Sum	1	R	-	R -
18.0	Certificate of Compliance	Sum	1	R	-	R -
	Total					R -

Solar Hybrid Inverter Specification

Model	SYNK-3.6K-SG03LP1	SYNK-5K-SG03LP1
Battery Input Data		
Battery Type	Lead-acid or Li-Ion	
Battery Voltage Range	48Vd.c (40Vd.c ~ 60Vd.c)	
Max. Charging/Discharging Current	90Ad.c (max.)	120Ad.c (max.)
Charging Curve	3 Stages / Equalization	
External Temperature Sensor	Yes	
Charging Strategy for Li-Ion Battery	Self-adaption to BMS	
PV String Input Data		
Max. DC Input Power	4680W	6500W
PV Input Voltage	370V (125V~500V)	
MPPT Range	150~425V	
Full Load DC Voltage Range	300~425V	
Start-up Voltage	125V	
PV Input Current	13Ad.c + 13Ad.c	
No. of MPPT Trackers	2	
No. of Strings Per MPPT Tracker	1+1	
AC Output Data		
Rated AC Output and UPS Power	3600W	5000W
Max. AC Output Power	3960W	5500W
Peak Power(off grid)	2 times of rated power, 10s	
AC Output Rated Current	16.4/15.7Aa.c	22.7/21.7Aa.c
Max. AC Current	18/17.2Aa.c	25/23.9Aa.c
Max. Continuous AC Passthrough	35A	
Power Factor	0.8 leading to 0.8 lagging	
Output Frequency and Voltage	50/60Hz; 220/230 (single phase)	
Grid Type	Single Phase	
Total Harmonic Distortion (THD)	<3% (of nominal power)	
DC current injection	<0.5% In	
Efficiency		
Max. Efficiency	97.60%	
Euro Efficiency	96.50%	
MPPT Efficiency	>99%	
Protection		
PV Input Lightning Protection	Integrated	
Anti-islanding Protection	Integrated	
PV String Input Reverse Polarity Protection	Integrated	
Insulation Resistor Detection	Integrated	
Residual Current Monitoring Unit	Integrated	
Output Over Current Protection	Integrated	
Output Shorted Protection	Integrated	
Surge Protection	DC Type II / AC Type II	
Over Voltage Category	DC Type II / AC Type III	

Model	SYNK-3.6K-SG03LP1	SYNK-5K-SG03LP1
Certifications and Standards		
Grid Regulation	VDE4105, IEC61727/62116, VDE0126, AS4777.2, CEI 0 21, EN50549-1, G98, G99, C10-11, UNE217002, NBR16149/NBR16150	
EMC/Safety Regulation	IEC/EN 62109-1, IEC/EN 62109-2, IEC/EN 61000-6-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, IEC/EN 61000-6-4	
General Data		
Operating Temperature Range	-40~60 °C, >45 °C Derating	
Cooling	Smart cooling	
Noise	<30 dB	
Communication with BMS	RS485; CAN	
Weight	20.5kg	
Cabinet size	330W×580H×232D mm (Excluding connectors and brackets)	
Protection Degree	IP65	
Installation Style	Wall-mounted	
Warranty	5 years	

Solar Hybrid Inverter Specification

FEATURES



• **Longer Cycle Life** - Offers up to 20 times longer cycle life & 5 times longer calendar life than lead acid batteries, minimizing replacement cost.



• **Superior Safety** - Lithium Iron Phosphate chemistry eliminates explosion risk or combustion due to high impact, overcharging or short circuit situation. First life battery.



• **Higher usable capacity** - Delivers high power, while maintaining cycling of double energy capacity of lead acid battery.



• **Wider Temperature Range** - $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$.



• **Lighter Weight** - About 40% of the weight of a comparable lead acid battery. A 'drop' in replacement for lead acid batteries.



• **Multi-protocol communication** - Multiple protocols that can be selected via PC with an included RS232 cable.



Solar/wind
Energy Storage



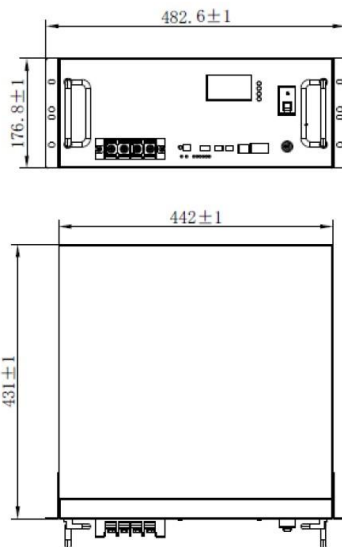
Caravan
power



Power
tools



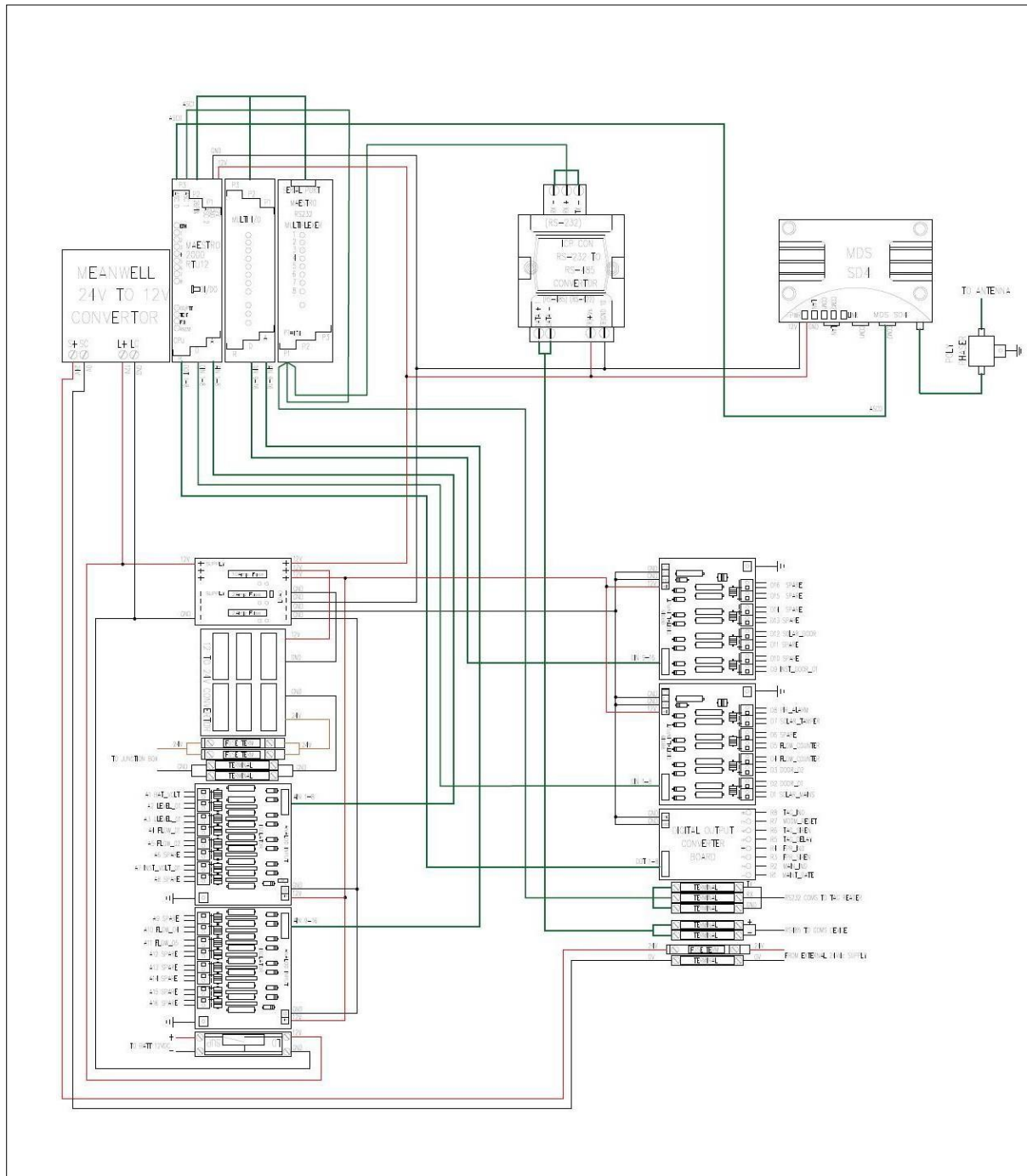
Backup power for
UPS systems



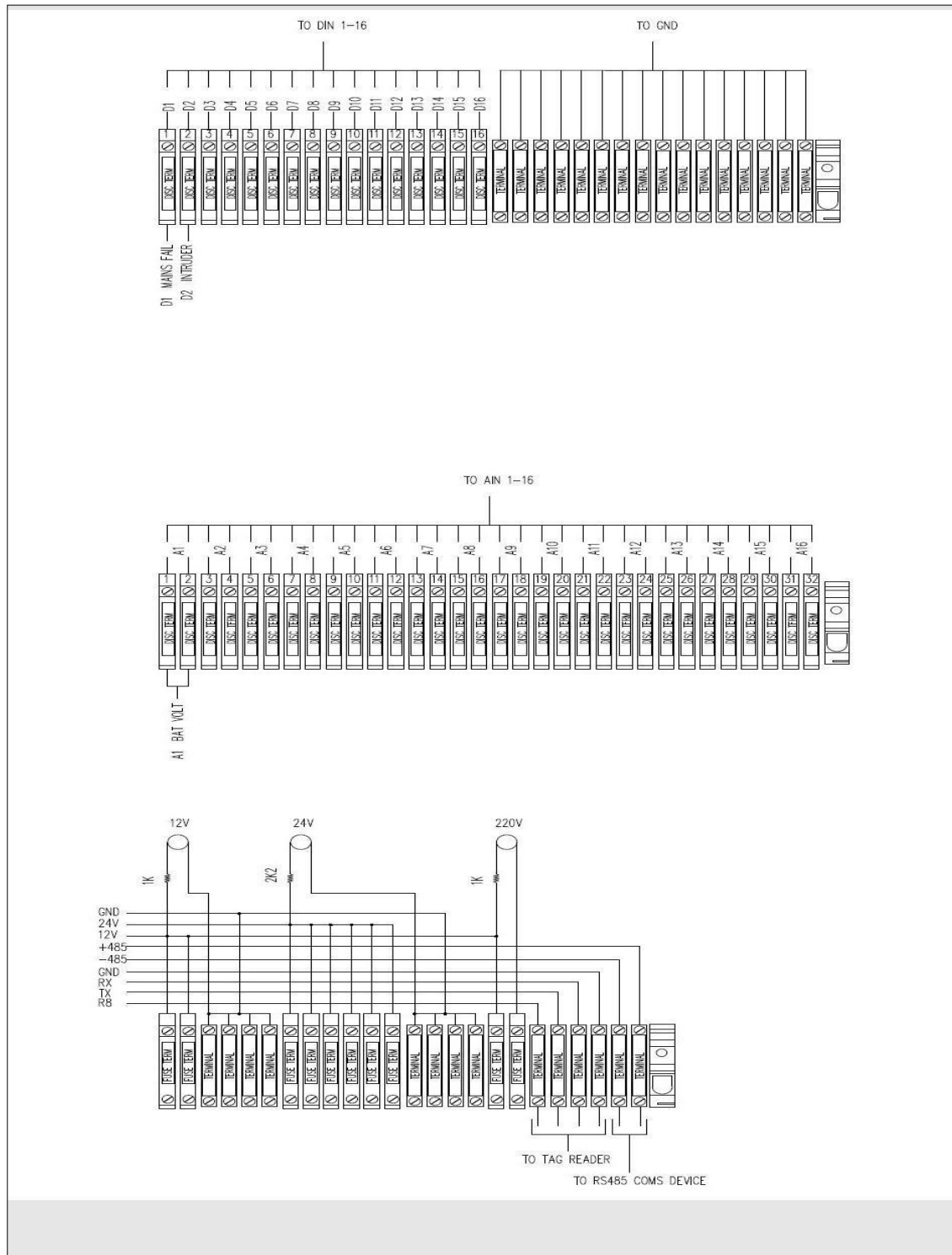
Model:	LFeLi 48100S2
Nominal voltage:	51.2V
Nominal Capacity:	100Ah
Energy:	5120Wh
Voltage range:	48~55V (limit: 45~57.6V)
Internal resistance:	<50mΩ
Cycle life:	>3500 cycles @ 100% DOD 25 ° C
Self discharge per month:	<3%
Charge voltage:	57V (±0.6V)
Charge current:	Recommended 20~50A
Max Discharge current:	100A Continuous (120-130A Pulse) [1C]
Communication:	CAN or R485 (+RS232 to USB)
Temperature Range:	-20~60 ° C

Drawings

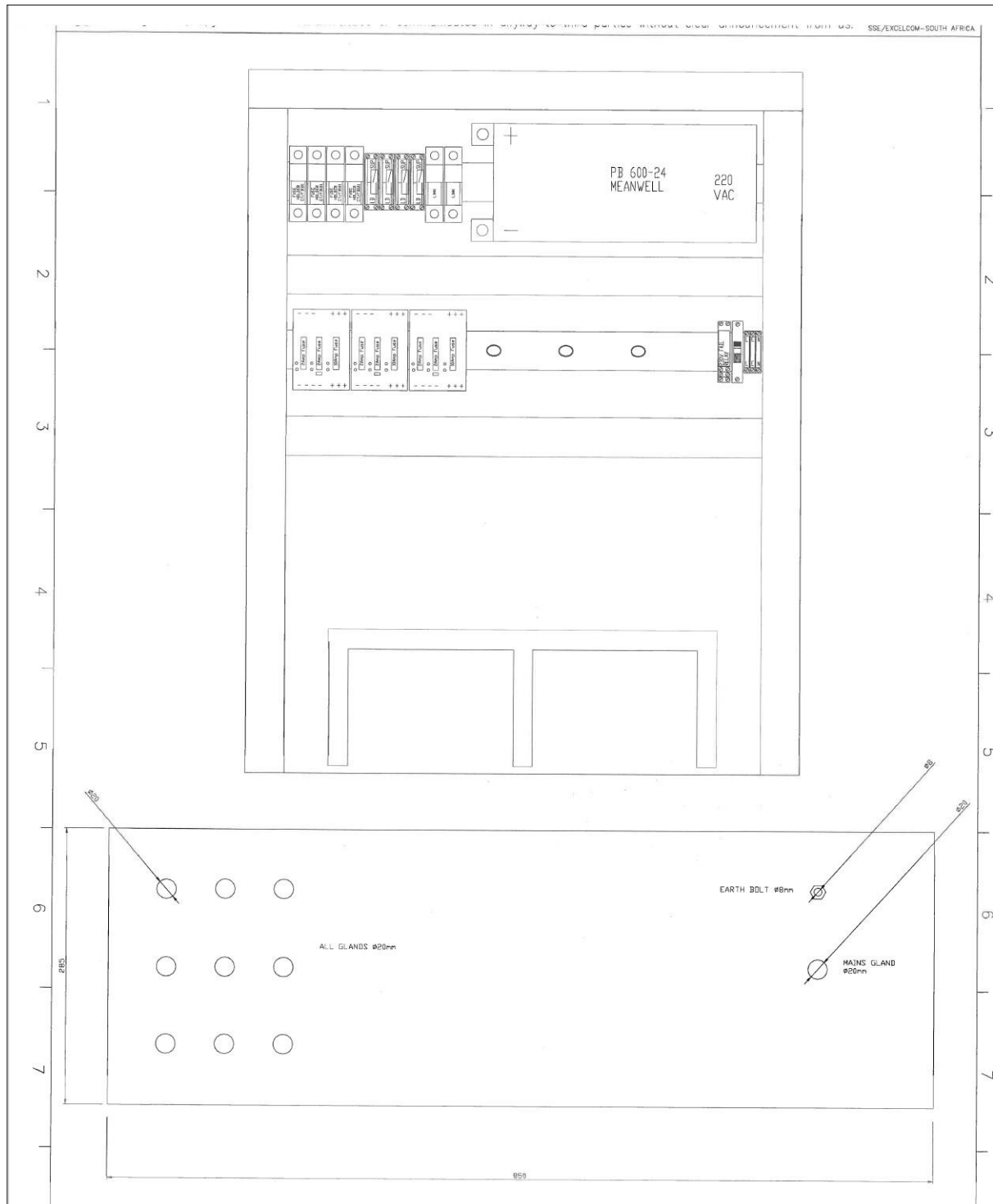
Telemetry Cabinet Wiring Diagram

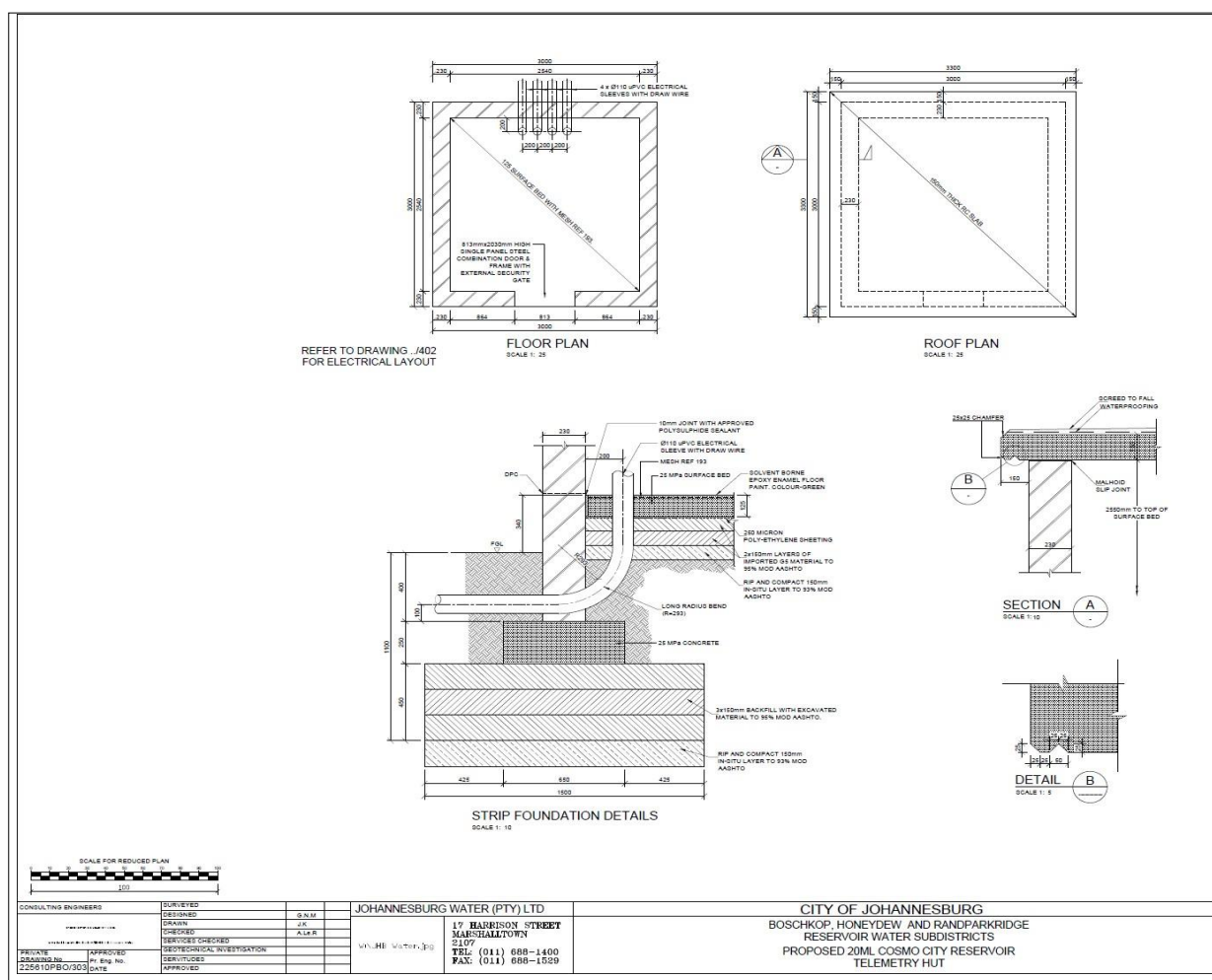


Telemetry Cabinet Wiring Diagram

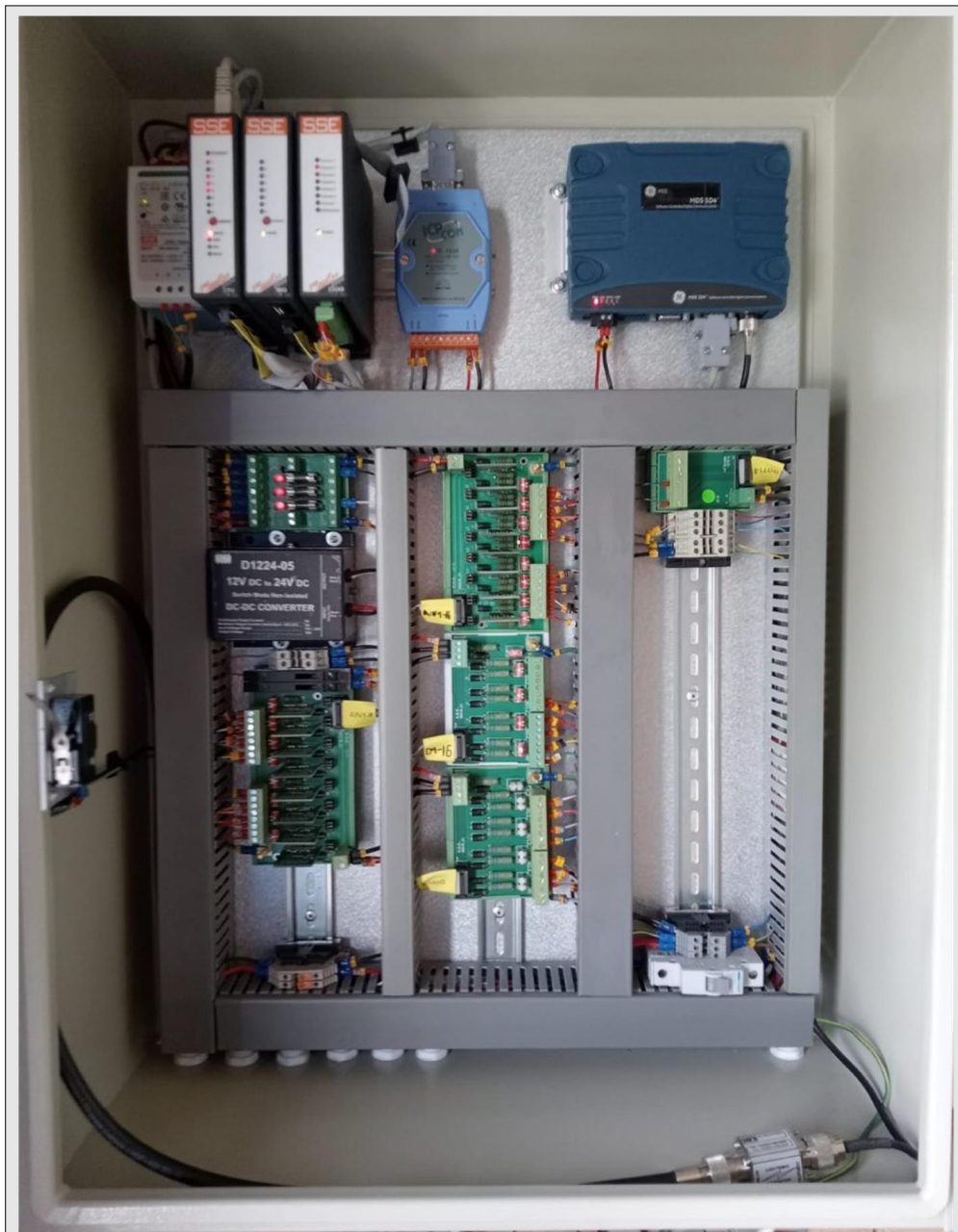


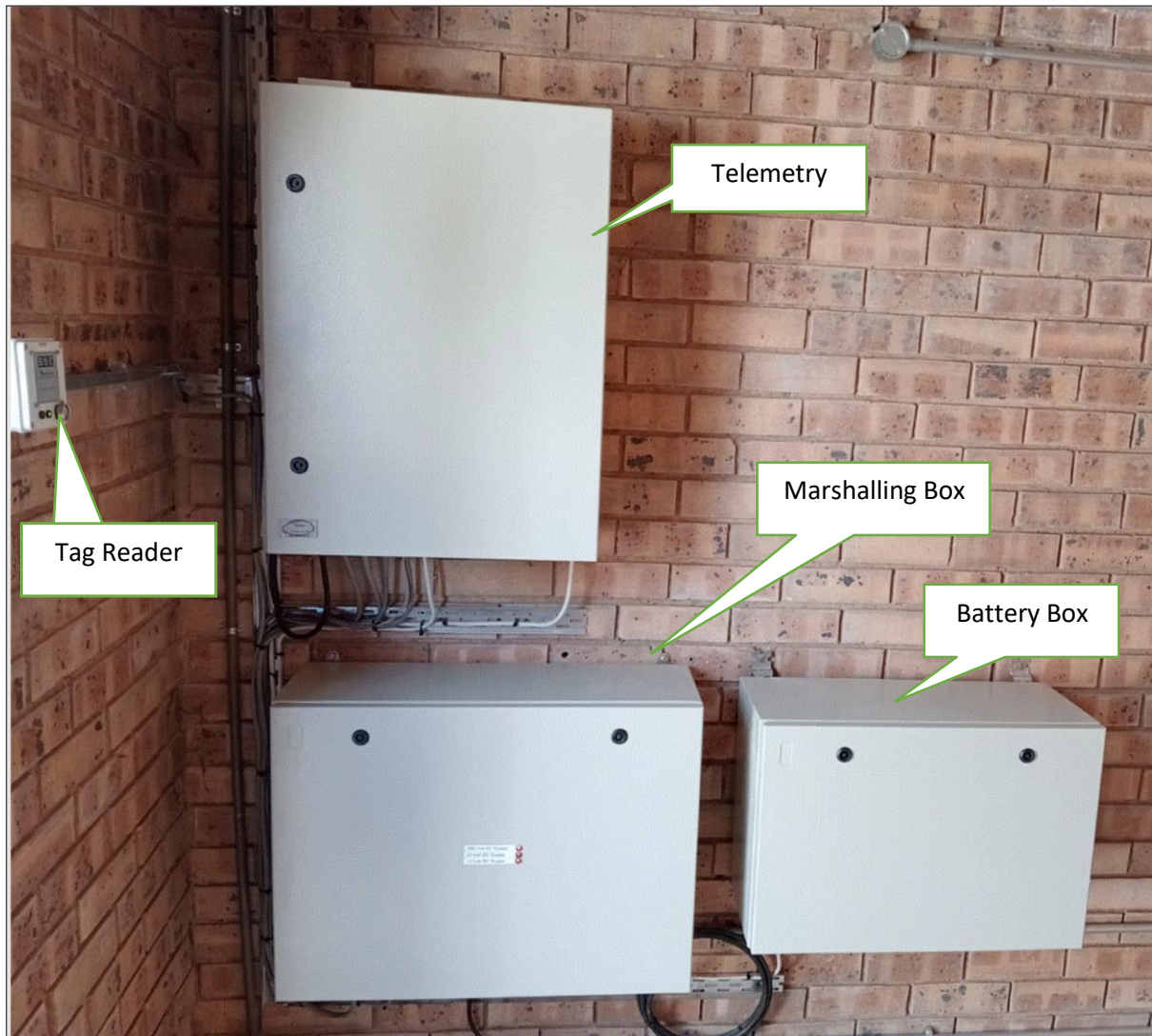
Battery Box 24 V





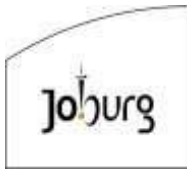
Telemetry Enclosure





BATTERY BOX





Johannesburg Water SOC Ltd



CONSTRUCTION OF 22 ML REINFORCED CONCRETE WOODMEAD RESERVOIR

VOLUME 2

PART 4: SITE INFORMATION



Employer:		Contractor	
Witness:		Witness:	

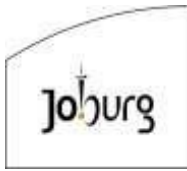


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Employer:		Contractor		283
Witness:		Witness:		



C4 site information

C4.1 GENERAL

This section describes the site at the time of tender to enable the tenderer to price his tender and to decide upon his method of working and programming and risks.

C4.2 SITE LOCATION

The site for the new Woodmead 22 ML Reservoir is located on the corner of Woodlands Drive and Jessica Close, Woodmead, Johannesburg.

C4.3 ACCESS TO SITE AND RESTRICTIONS

The works are located within the City of Johannesburg owned properties. Any other permission as may become necessary shall be the responsibility of the Contractor to obtain.

Having been granted access to works areas by the Employer, other service authorities and private owners, the Contractor shall adhere to any agreed conditions of access and ensure the works area is left in a condition similar to when it was first accessed.

C4.4 EXISTING SERVICES, SERVITUDES AND WAYLEAVES

For detailed specification the Contractor shall refer to clauses PS1.5 (Temporary Works), PS4.5 (Existing services), and PS4.8 (Permits and wayleaves). It shall be the responsibility of the Contractor to obtain and maintain all required wayleaves, and to comply with all wayleave conditions.

A GPR survey has been undertaken to identify potential existing services on areas of the site. Drawings are attached which show identified services. The position of existing services indicated on the drawings are not guaranteed nor does the Employer or the Engineer accept any liability in this regard.

C4.5 SECURITY

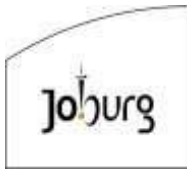
The Contractor shall be responsible for the security of his personnel, materials, equipment and construction plant on and around the site of the Works and for the security of his camp (if applicable). The Employer in this regard will consider no claims.

Refer to clause PS6.1 (Security)

C4.6 NATURE OF GROUND AND SUBSOIL CONDITIONS

It shall be the Contractor's responsibility to acquaint himself with the conditions of the site.

Employer:		Contractor	
Witness:		Witness:	



C4.7 GEOTECHNICAL REPORT AND BOREHOLE CORES

A geotechnical investigation has been undertaken for the site and the geotechnical report is attached.

C4.8 HYDROLOGICAL REPORT

No Hydrological investigations have been undertaken.

C4.9 TOPOGRAPHICAL SURVEY

A topographical survey has been undertaken for the site. Contours have been included in all relevant drawings under Volume 3.

Employer:		Contractor	
Witness:		Witness:	

REPORT NO 15/105/VH

AUGUST 2015

GEOTECHNICAL INVESTIGATION FOR PROPOSED WOODMEAD RESERVOIR

1. INTRODUCTION AND TERMS OF REFERENCE

At the request of Mr V. Wilson-Taylor of UWP Consulting we have carried out a geotechnical investigation for the proposed reservoir development in Woodmead. Confirmation of our appointment to proceed with the investigation was given via an email from UWP Consulting. A copy of a site locality plan was received to facilitate the investigation.

The proposed development is to comprise a water reservoir of unknown volume. Exact earthworks levels are unknown at this stage.

The terms of reference are as follows:

- (i) to establish the nature and relevant engineering properties of the upper soil and rock strata underlying the site.
- (ii) to comment on suitable excavation procedures for cut terrace excavations and for the installation of services.
- (iii) to present comments on the use of the on site soils in the construction of bulk fill terraces.
- (iv) to give foundation recommendations for the proposed reservoir development.
- (v) to comment on any other geotechnical aspects that may affect the development.

2. SITE DESCRIPTION

The area of investigation comprises a vacant portion of land located to the north east of the intersection between Woodmead Drive and Woodlands Drive in the Woodmead area. The western portions of the site comprise a relatively elevated area of uneven and variable topography owing to the presence of abundant building rubble and soil spoil piles. The central to eastern portions of the site appear to have been exploited for borrow materials in the past, resulting in a cut terrace excavation of approximately 2,5m depth relative to the more elevated western portions of the site. Overall site topography shows a gentle to moderate

dip towards the east, with vegetation comprising predominantly veld grass along with scattered trees along the northern, eastern and western boundaries of the site. Abundant oversized granite corestones are present at natural ground level throughout the southern portions of the site.

3. NATURE OF INVESTIGATION

3.1 Fieldwork

Six test pits (TP1 to TP6) were excavated across the site on 17 June 2015 using a JCB 200 excavator. The test pits were excavated to the excavation limit of the machine in all instances. All test pits were profiled in situ by an engineering geologist and where necessary disturbed soil samples were taken for laboratory testing. The positions of the test pits are shown on the site plan enclosed in Appendix A. Copies of the recorded test pit soil profiles are presented in Appendix B.

3.2 Laboratory Testing

The following laboratory tests have been carried out on the soil samples recovered from the test pits during the field investigation.

- (i) Atterberg limits and particle size distribution analyses to determine basic engineering properties and to effect classification.
- (ii) Moisture/density and California Bearing Ratio (CBR) tests to evaluate compaction and related strength characteristics.

The laboratory test results are presented in Appendix C.

4. SITE GEOLOGY/SOIL PROFILE

Available geological maps indicate that the area of investigation is underlain by **granite** of the Johannesburg Granite Dome. This was confirmed during the present investigation. Residual soils have developed from the weathering of the granite bedrock. A layer of fill material generally forms the upper soil layer across the site. The general soil profile is described below.

The upper soil layer comprises between 0,4m and 0,8m of medium dense to dense layered silty sand with scattered to abundant gravel, cobbles and scattered solid waste. These soils are of **fill** origin. Locally the upper fill materials extend to a depth of the order of 2,2m below existing ground surface (see TP4, western portions of the site).

The upper fill materials are underlain by loose to medium dense / medium dense intact silty sand with abundant quartz gravel. This gravel layer represents the **transported pebble marker** and generally extends to depths varying between 0,9m and 1,2m. Locally the pebble marker horizon occurs at a depth of the order of 2,2m to 2,4m below existing ground surface (see TP4, western portions of the site). In test pits TP1 and TP2 the pebble marker horizon is locally overlain by loose intact silty sand of **transported hillwash** origin, encountered between depths of the order of 0,4m to 0,6m and extending to a depth of 0,9m below existing ground surface.

The transported soil horizons are underlain by medium dense / medium dense to dense intact silty sand / slightly clayey silty sand **reworked residual granite**. The reworked zone generally extends to depths varying between 1,0m and 2,2m below existing ground surface, but locally extends to a depth of the order of 3,2m (see TP4).

The reworked zone is underlain by medium dense / medium dense to dense jointed silty sand **residual granite**. In test pits TP1 to TP3, TP5 and TP6 the excavation limit of the machine was obtained at 4,0m depth within the residual granite. In test pit TP4 the residual granite extends to a depth in excess of 6,3m below existing ground surface. No refusal of the excavator was encountered in the test pit excavations across the site.

At the time of investigation no perched water table or zones of seepage were noted in the test pit excavations across the site.

5. **EXCAVATION PROCEDURES**

Excavation procedures for cut excavations and for the installation of services have been evaluated according to the South African National Standards standardized classification for excavations (SANS 1200D, DA and DB). According to this classification the area of investigation classifies as **soft excavation** to depths in excess of 4,0m, and locally extending to depths in excess of 6,3m (see TP4, western portions of the site).

Thus no problems are envisaged related to earthworks or for the installation of services across the site.

6. **MATERIALS USAGE**

Based on the laboratory test results the following comments are considered pertinent to the on site soils for use in the construction of bulk fill terraces, access roads and parking areas.

- The upper 150mm of in situ soil across the site generally contains abundant organic matter and is unsuitable for use as construction material. This material should be removed to spoil.
- In the vicinity of large trees it is envisaged that the upper 0,5m of in situ soil would contain abundant tree roots and would be unsuitable for use as construction material. This would though need to be assessed at the time of construction.
- The upper fill materials are considered suitable for use as general fill and selected layer material.
- Notwithstanding the laboratory test result which indicates a G10 classification, we are of the opinion that the in situ soils (transported hillwash / pebble marker and reworked / residual granite) would be suitable for use as general fill **and lower selected layer material**.

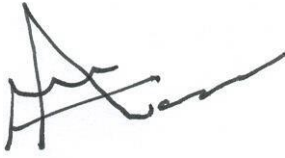
7. EVALUATION OF FOUNDING CONDITIONS AND FOUNDATION RECOMMENDATIONS

The upper fill materials and underlying transported hillwash / pebble marker horizons are considered to be potentially highly compressible / collapsible and are thus unsuitable for use as founding horizons for the proposed reservoir.

An allowable bearing pressure of 250kPa is applicable to the underlying medium dense or better reworked / residual granite. These founding horizons generally occur at depths varying between 0,9m and 2,2m below existing ground surface (average depth to founding horizon of the order of 1,6m), but locally occur at a noteworthy depth of the order of 3,2m below existing ground surface (see TP4, situated in an area of thick overlying fill materials). Depending on final earthworks levels **conventional and / or localised deeper than normal strip / spread foundations** could be utilised as suitable foundation types for the reservoir. Under the above load conditions total settlements of the order of 5mm to 10mm are envisaged. Differential settlements should be taken as 50% of total settlements.

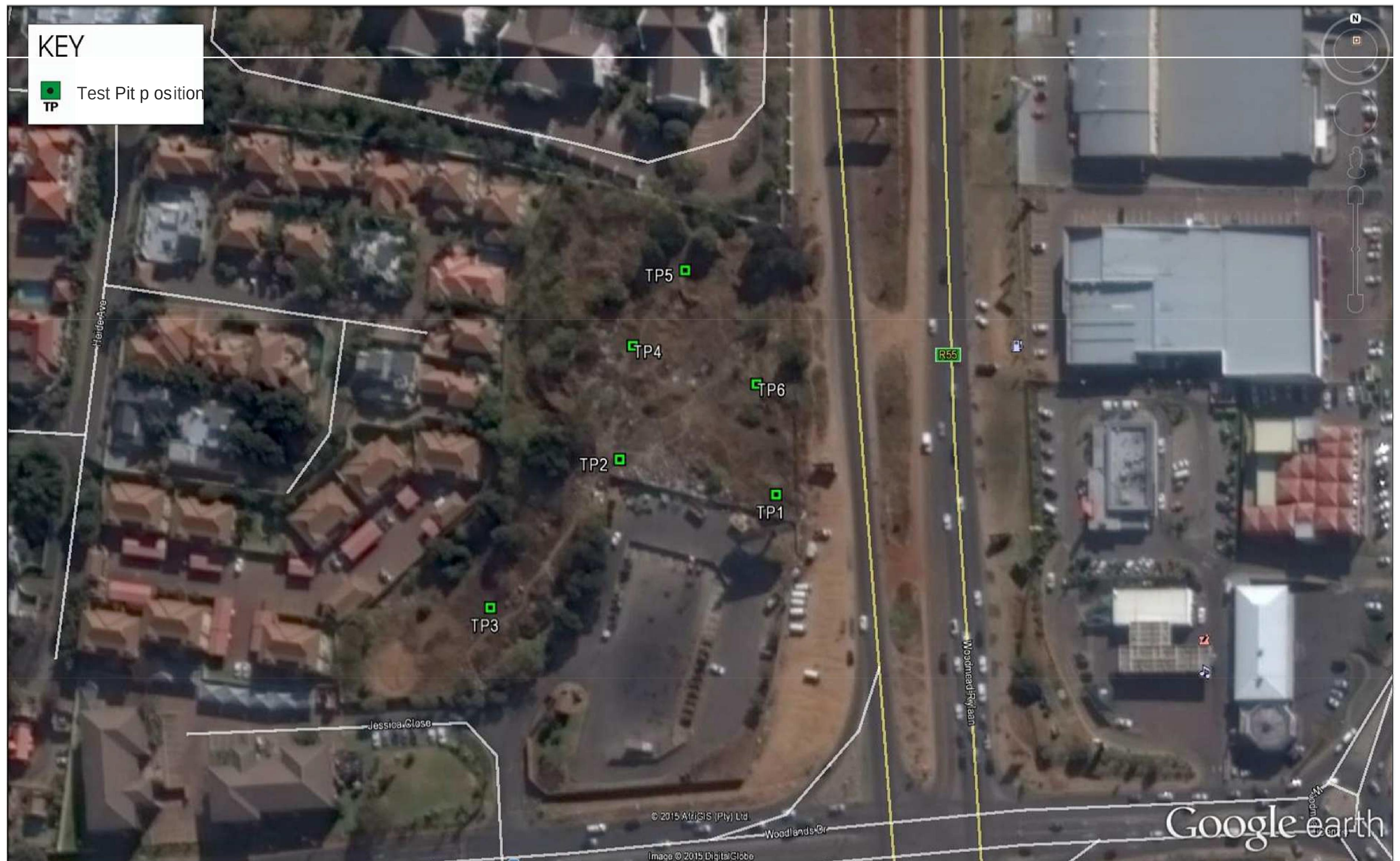
8. SUB-SURFACE DRAINAGE

Although no perched water table or zones of seepage were encountered in the test pit excavations across the site at the time of investigation, we are nevertheless of the opinion that a perched water table could occur at shallow depth and become widespread across the site in the long term during and/or shortly after periods of heavy and/or continuous rainfall. Taking this into account it is recommended that conventional drainage be allowed for behind all retaining walls within areas of cut for long term conditions.

A handwritten signature in black ink, appearing to be 'M. Crossman', written in a cursive style.

M CROSSMAN Pr Eng
CROSSMAN, PAPE & ASSOCIATES

J DAVEL Pr.Sci.Nat



**PROJECT: 15/105 .H
GEOTECHNICAL INVESTIGATION:
WOODMEAD RESERVOIR**

**LOCALITY PLAN INDICATING
APPROXIMATE POSITIONS OF TEST PITS**

Crossman, Pape & Associates
Consulting Geotechnical Engineers & Engineering Geologists
ffl flll: 2 0 0 m cr-drw 20 GO. Tch f0111-Glo L&R , h:::(011) &@., jL 6, Cc:108'2 1586 1101 IrOIG 9G68

Scale: Not to scale

Date: JULY 2015

Client : CROSSMAN PAPE ASSOCIATES cc
Address : P O BOX 3557
 : KRAMERVIEW
 : 2060

Client Reference :
Order No. : Justin

Attention :
Facsimile : 011 465 4586
E-mail : lynne@crossmanpape.co.za

Date Received : 23/06/2015
Date Tested : 23/06/2015 - 09/07/2015
Date Reported : 09/07/2015

Project : Woodmead Reservoir
Project No. : 2015-B-1353

Page : 1 of 6

Herewith please find the test report(s) pertaining to the above project. All tests were conducted in accordance with prescribed test method(s). Information herein consists of the following:

Test(s) conducted / Item(s) measured	Qty.	Test Method(s)	Authorized By	Page(s)
MDD & OMC	2.000	TMH1 A7	S Pullen	4-5
Atterberg Limits < 0.425mm	5.000	TMH1 A2, A3, A4	S Pullen/J Marques	2-3, 6
Sieve Analysis 0.075mm (Mass Grading)	5.000	TMH1 A1	S Pullen/J Marques	2-3, 6
C.B.R.	2.000	THM1 A9	S Pullen	6
Hydrometer Analysis	3.000	ASTM D422	J Marques/S Pullen	2-3

Any test results contained in this report and marked with * in the table above are "not SANAS accredited" and are not included in the schedule of accreditation for this laboratory.

Any information contained in this test report pertain only to the areas and/or samples tested. Documents may only be reproduced or published in their full context.

While every care is taken to ensure that all tests are carried out in accordance with recognised standards, neither Civilab (Proprietary) Limited nor its employess shall be liable in any way whatsoever for any error made in the execution or reporting of tests or any erroneous conclusions drawn therefrom or for any consequences thereof.

All interpretations, Interpolations, Opinions and/or Classifications contained in this report falls outside our scope of accreditation.

The following parameters, where applicable, were excluded from the classification procedure: Chemical modifications, Additional fines, Fractured Faces, Soluble Salts, pH, Conductivity, Coarse Sand Ratio, Durability (COLTO: G4-G9).

The following parameters, where applicable, were assumed: Rock types were assumed to be of an Arenaceous nature with Siliceous cementing material.

Unless otherwise requested or stated, all samples will be discarded after a period of 3 months.

Deviations in Test Methods:

Client : CROSSMAN PAPE ASSOCIATES cc

Date Received: 23/06/2015

Project : Woodmead Reservoir

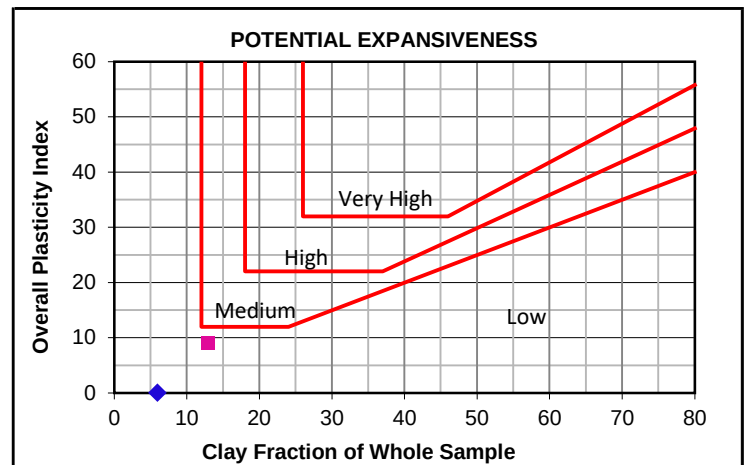
Date Reported: 09/07/2015

Project No : 2015-B-1353

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FOUNDATION INDICATOR

Laboratory Number	2	4
Field Number	TP4	TP4
Client Reference		
Depth (m)	0.1-0.5	2.4-3.2
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed		
Stabilizing Agent		

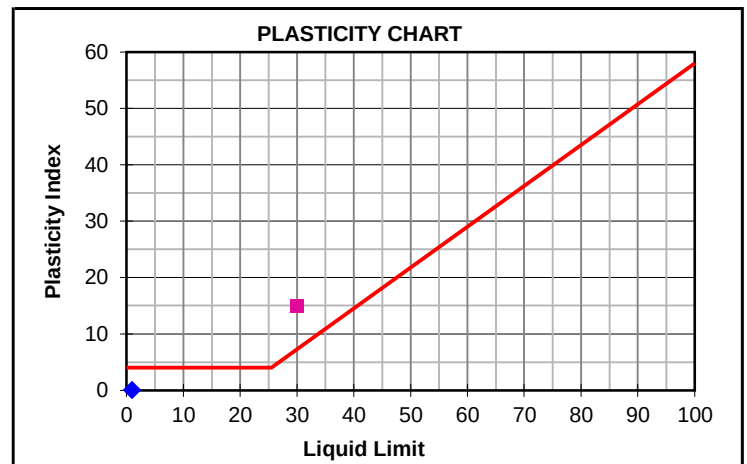


Moisture Content & Relative Density-TMH1 Method A12T

Moisture Content (%)		
Relative Density (S.G.)		

Sieve Analysis (Wet Preparation) - TMH1 Method A1(a)

Percentage Passing	75.0 mm	100	100
	63.0 mm	100	100
	53.0 mm	100	100
	37.5 mm	100	100
	26.5 mm	100	100
	19.0 mm	100	100
	13.2 mm	100	100
	4.75 mm	96	100
	2.00 mm	85	93
	0.425 mm	60	58
0.075 mm	30	39	
Grading Modulus		1.25	1.1



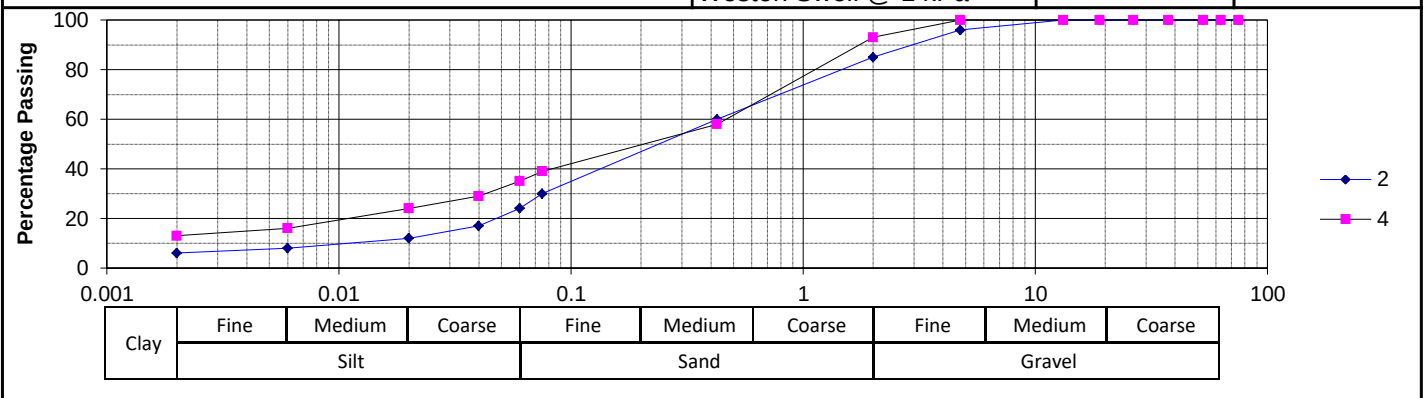
Hydrometer Analysis - ASTM Method D422

Percentage Passing	0.060 mm	24	35
	0.040 mm	17	29
	0.020 mm	12	24
	0.006 mm	8	16
	0.002 mm	6	13
Gravel	%	15	7
Sand	%	61	58
Silt	%	18	22
Clay	%	6	13

Laboratory Number	2	4	
Atterberg Limits - TMH1 Method A2, A3 & A4			
Liquid Limit	%		30
Plasticity Index	%	NP	15
Linear Shrinkage	%		6.5
Overall PI	%		9

Classifications

HRB	A-2-4(0)	A-6(2)
Unified	SC	SC
Weston Swell @ 1 kPa		



Client : CROSSMAN PAPE ASSOCIATES cc
Project : Woodmead Reservoir

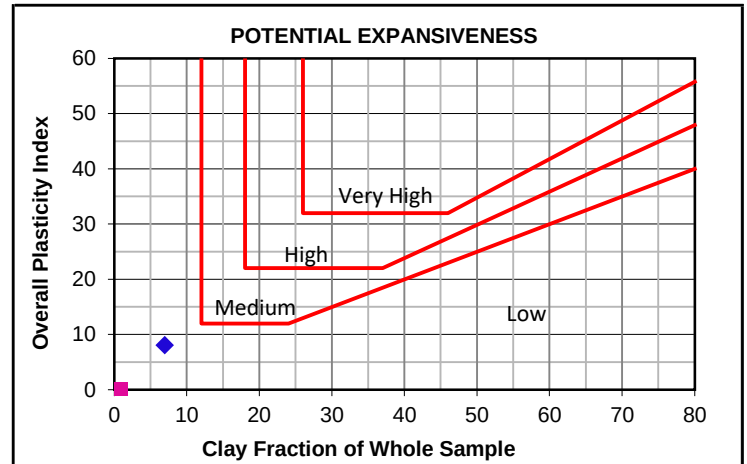
Date Received: 23/06/2015
Date Reported: 09/07/2015

Project No : 2015-B-1353

Page No. : 3 of 6

FOUNDATION INDICATOR

Laboratory Number	5	
Field Number	TP4	
Client Reference		
Depth (m)	3.2-4.3	
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed		
Stabilizing Agent		

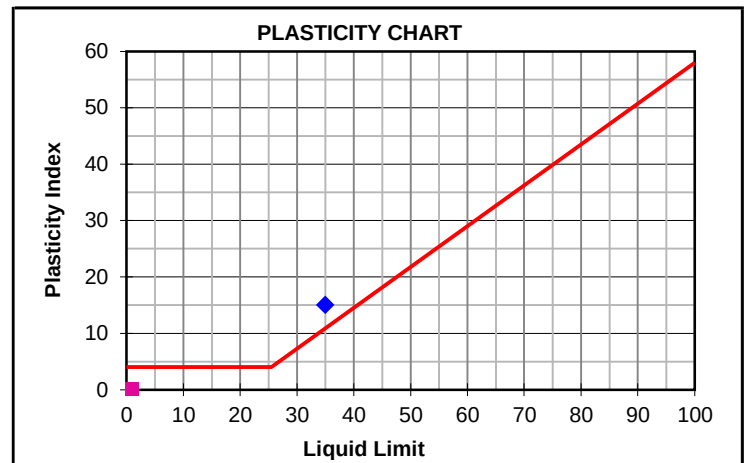


Moisture Content & Relative Density-TMH1 Metod A12T

Moisture Content (%)		
Relative Density (S.G.)		

Sieve Analysis (Wet Preparation) - TMH1 Method A1(a)

Percentage Passing	75.0 mm	100	
	63.0 mm	100	
	53.0 mm	100	
	37.5 mm	100	
	26.5 mm	100	
	19.0 mm	100	
	13.2 mm	100	
	4.75 mm	99	
	2.00 mm	92	
	0.425 mm	51	
0.075 mm	36		
Grading Modulus		1.21	



Hydrometer Analysis - ASTM Method D422

Percentage Passing	0.060 mm	32	
	0.040 mm	26	
	0.020 mm	20	
	0.006 mm	10	
	0.002 mm	7	
Gravel	%	8	
Sand	%	60	
Silt	%	25	
Clay	%	7	

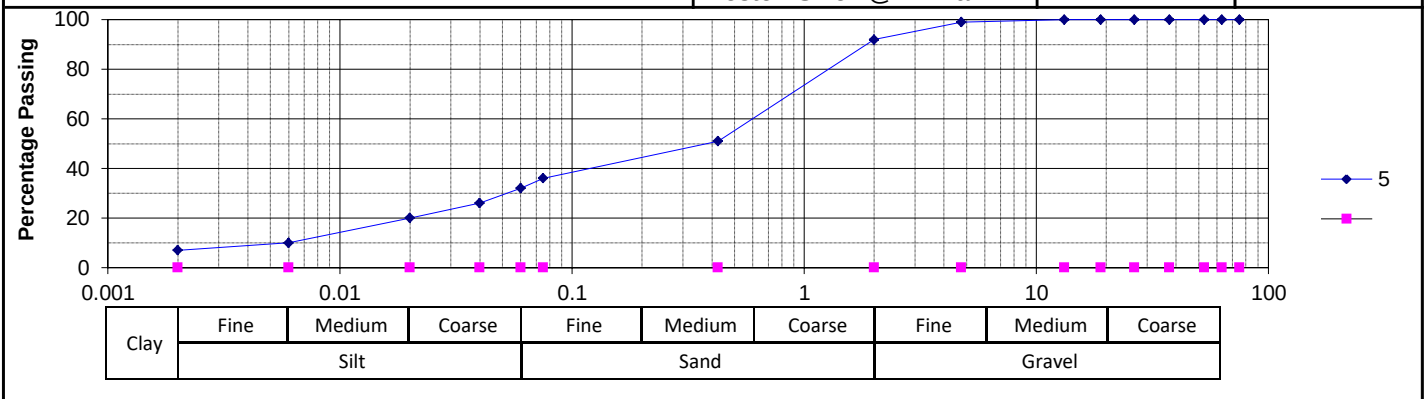
Laboratory Number 5

Atterberg Limits - TMH1 Method A2, A3 & A4

Liquid Limit	%	35	
Plasticity Index	%	15	
Linear Shrinkage	%	6.0	
Overall PI	%	8	

Classifications

HRB	A-6(1)	
Unified	SC	
Weston Swell @ 1 kPa		



Client : CROSSMAN PAPE ASSOCIATES cc
Project : Woodmead Reservoir

Date Received: 23/06/2015

Date Reported: 09/07/2015

Project No: 2015-B-1353

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MOISTURE DENSITY RELATIONSHIP

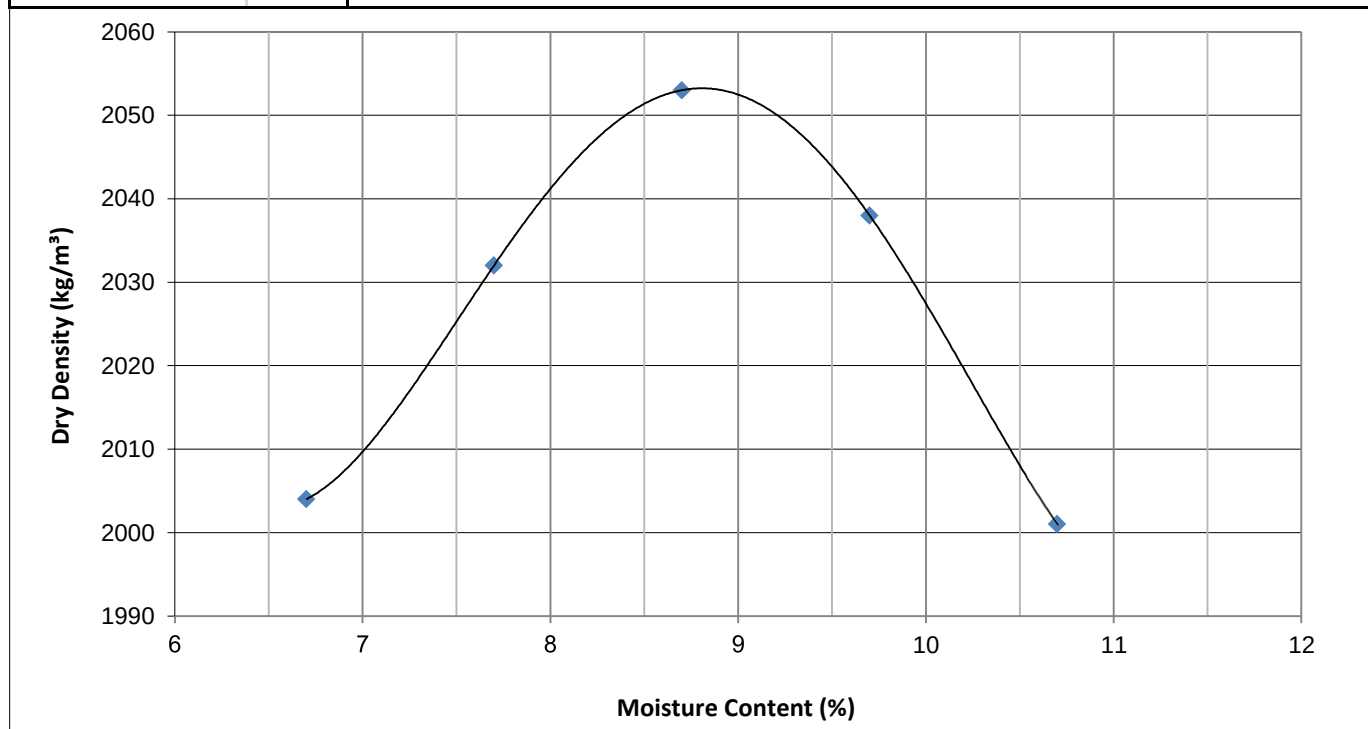
Laboratory Number	1	
Field Number	TP2	
Client Reference		
Depth (m)	0.8-2.0	
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed		
Stabilizing Agent		

Maximum Dry Density & Optimum Moisture Content - TMH1 Method A7

Compactive Effort:	Modified AASHTO

Dry Density	kg/m ³	2004	2032	2053	2038	2001	
Moisture Content	%	6.7	7.7	8.7	9.7	10.7	

Max. Dry Density	kg/m ³	2053
Optimum Moisture	%	8.8



Client : CROSSMAN PAPE ASSOCIATES cc
 Project : Woodmead Reservoir

Date Received: 23/06/2015
 Date Reported: 09/07/2015

Project No: 2015-B-1353

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MOISTURE DENSITY RELATIONSHIP

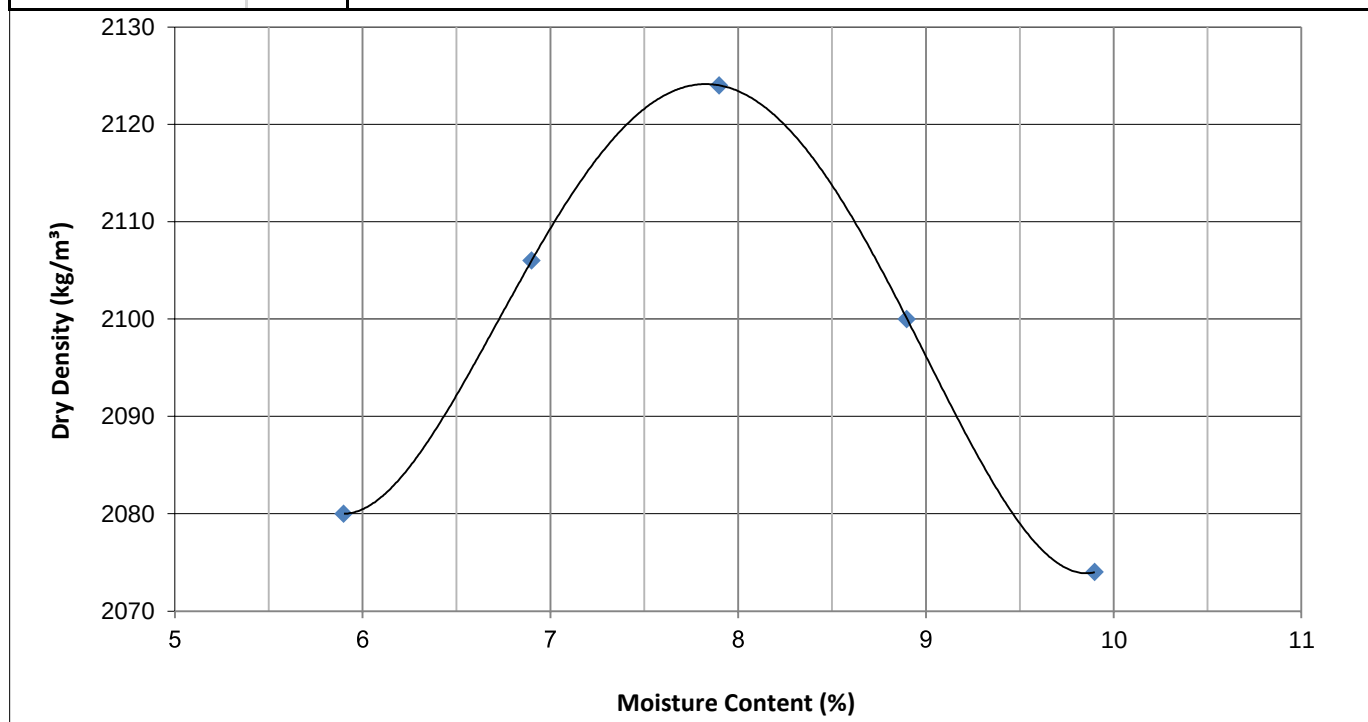
Laboratory Number	3	
Field Number	TP4	
Client Reference		
Depth (m)	0.1-2.2	
Position		
Coordinates	X	
	Y	
Description		
Additional Information		
Calcrete / Crushed		
Stabilizing Agent		

Maximum Dry Density & Optimum Moisture Content - TMH1 Method A7

Compactive Effort:	Modified AASHTO

Dry Density	kg/m ³	2080	2106	2124	2100	2074	
Moisture Content	%	5.9	6.9	7.9	8.9	9.9	

Max. Dry Density	kg/m ³	2124
Optimum Moisture	%	7.8



Client : CROSSMAN PAPE ASSOCIATES cc
Project : Woodmead Reservoir

Date Received : 23/06/2015
Date Reported : 09/07/2015

Project No. : 2015-B-1353

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CALIFORNIA BEARING RATIO (CBR) & ROAD INDICATOR REPORT

Laboratory No.	1	3
Field Number	TP2	TP4
Client Reference		
Depth (m)	0.8-2.0	0.1-2.2
Position		
Coordinates	X	
	Y	
Description		
Additional information		
Calcrete/Crushed		
Stabilizing Agent		

Sieve Analysis (Wet preparation) - TMH1 Method A1(a)

Percentage Passing	75.0 mm	100	99
	63.0 mm	100	99
	53.0 mm	100	99
	37.5 mm	100	97
	26.5 mm	100	95
	19.0 mm	100	94
	13.2 mm	100	88
	4.75 mm	100	80
	2.00 mm	99	68
	0.425 mm	85	39
	0.075 mm	47	25
Grading Modulus		0.69	1.68

Soil Mortar Analysis

Coarse Sand	14	43
Coarse Fine Sand	14	8
Medium Fine Sand	12	8
Fine Fine Sand	12	5
Silt and Clay	47	36

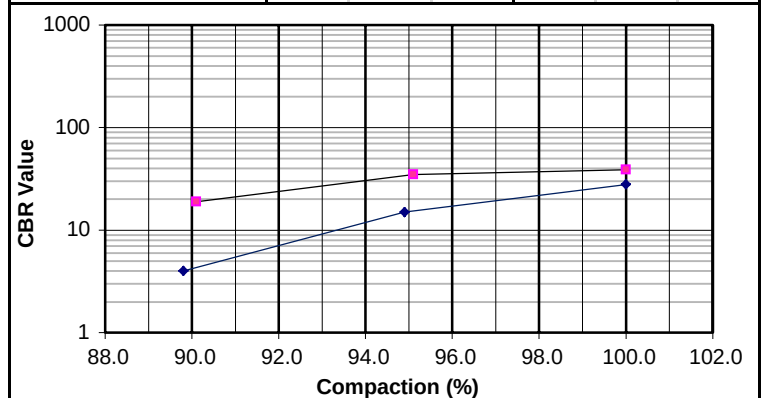
Atterberg Limits - TMH1 Method A2,A3&A4

Liquid Limit (%)	23	26
Plasticity Index (%)	11	10
Linear Shrinkage (%)	4.5	4.5

Laboratory No.	1	3	
Maximum Dry Density & Optimum Moisture Content - TMH1 A7			
MDD	kg/m ³	2053	2124
OMC	%	8.8	7.8

California Bearing Ratio - TMH1 Method A8

Compaction Data							
Moisture	%	8.8			7.8		
Dry Density	kg/m ³	2054	1949	1844	2125	2020	1913
Compaction	%	100.0	94.9	89.8	100.0	95.1	90.1
Penetration Data							
CBR at	2.54 mm	28	15	4	39	35	19
	5.08 mm	25	12	3	56	39	16
	7.62 mm	24	10	3	63	39	15
Swell	%	0.3	0.2	0.2	0.1	0.2	0.2
Final Moisture (%)		11.3	12.9	16	8.7	10.2	11.2

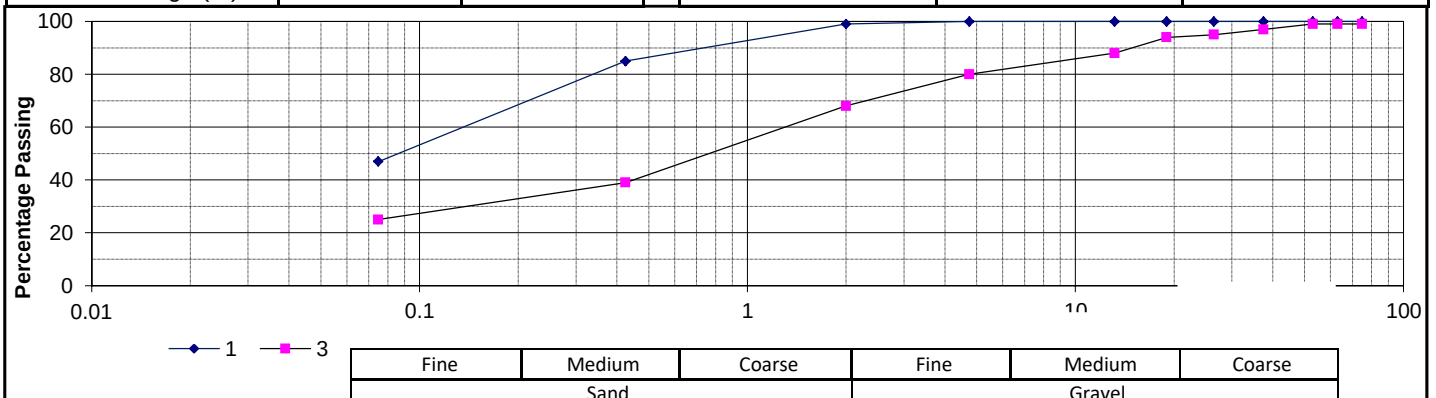


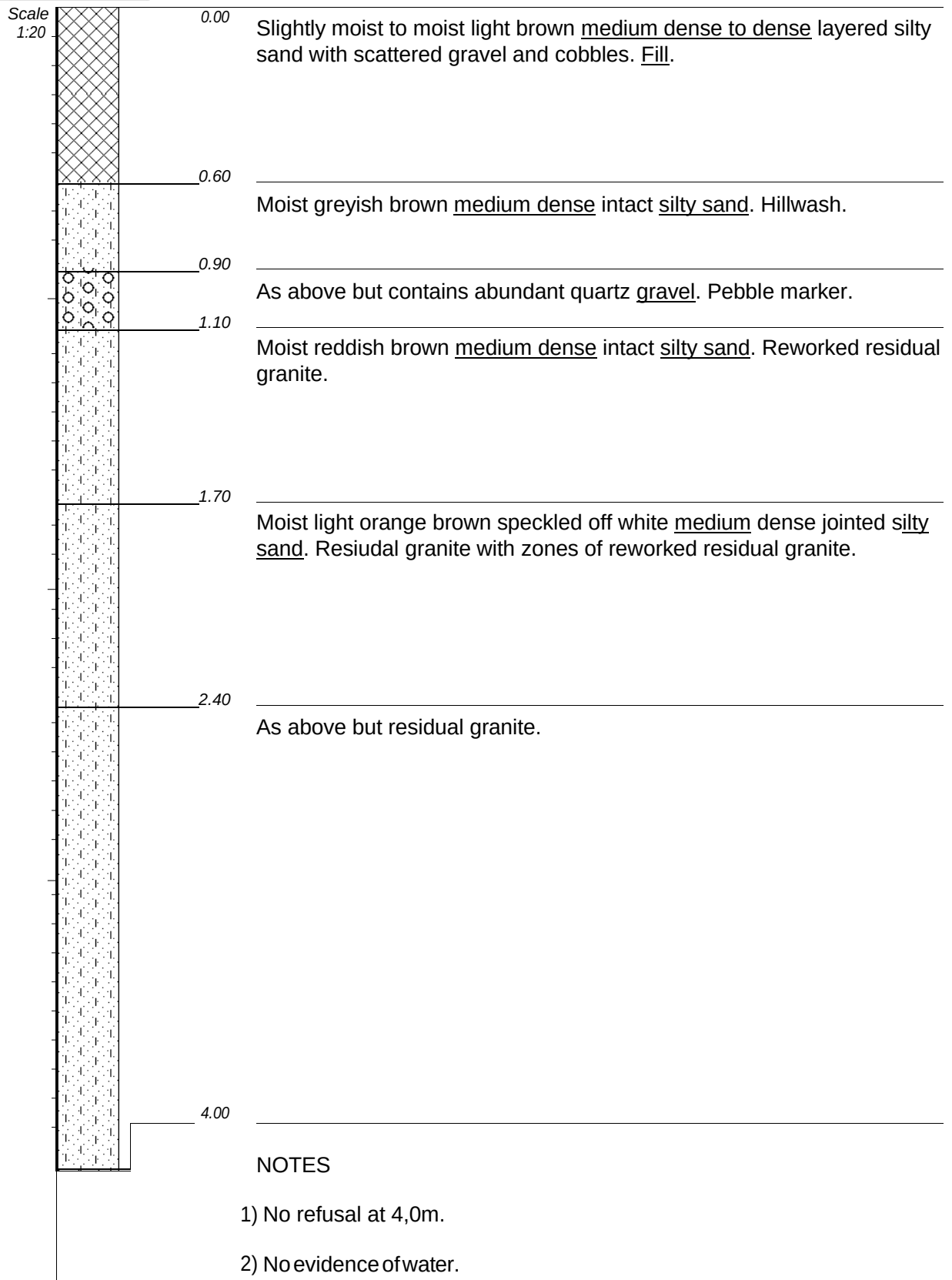
Interpolated CBR Data

@ 100%	28	38.9
@ 98%	22.2	37.1
@ 97%	19.7	36.2
@ 95%	15.6	34.2
@ 93%	9.2	26.9
@ 90%	4.1	18.7

Classifications

HRB	A-6(2)	A-2-4(0)
COLTO	None	G6
TRH14	G10	G6





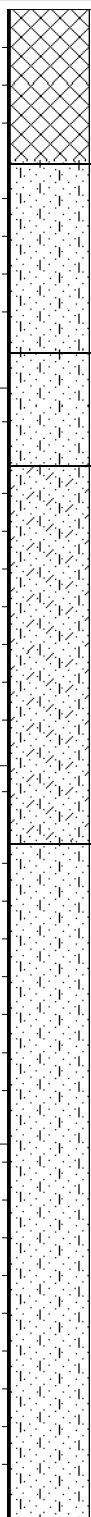
CONTRACTOR :
MACHINE: JCB 200 SC Excavator
DRILLED BY :
PROFILED BY : Justin can Huysteen
TYPE SET BY : Renee
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 18/06/2015
DATE : 24/06/2015 11:54
TEXT : ..05TPWoodmeadReservoir.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP1**

Scale
1:20



0.00

Slightly moist to moist light brown medium dense to dense layered silty sand with scattered gravel and cobbles. Fill.

0.40

Moist red brown loose intact silty sand. Hillwash.

0.90

As above but loose to medium dense and contains abundant quartz gravel. Pebble marker.

1.20

Moist red brown loose intact slightly clayey silty sand. Reworked residual granite.

2.20

Moist light olive beige speckled off white medium dense jointed silty sand. Residual granite.

4.00

NOTES

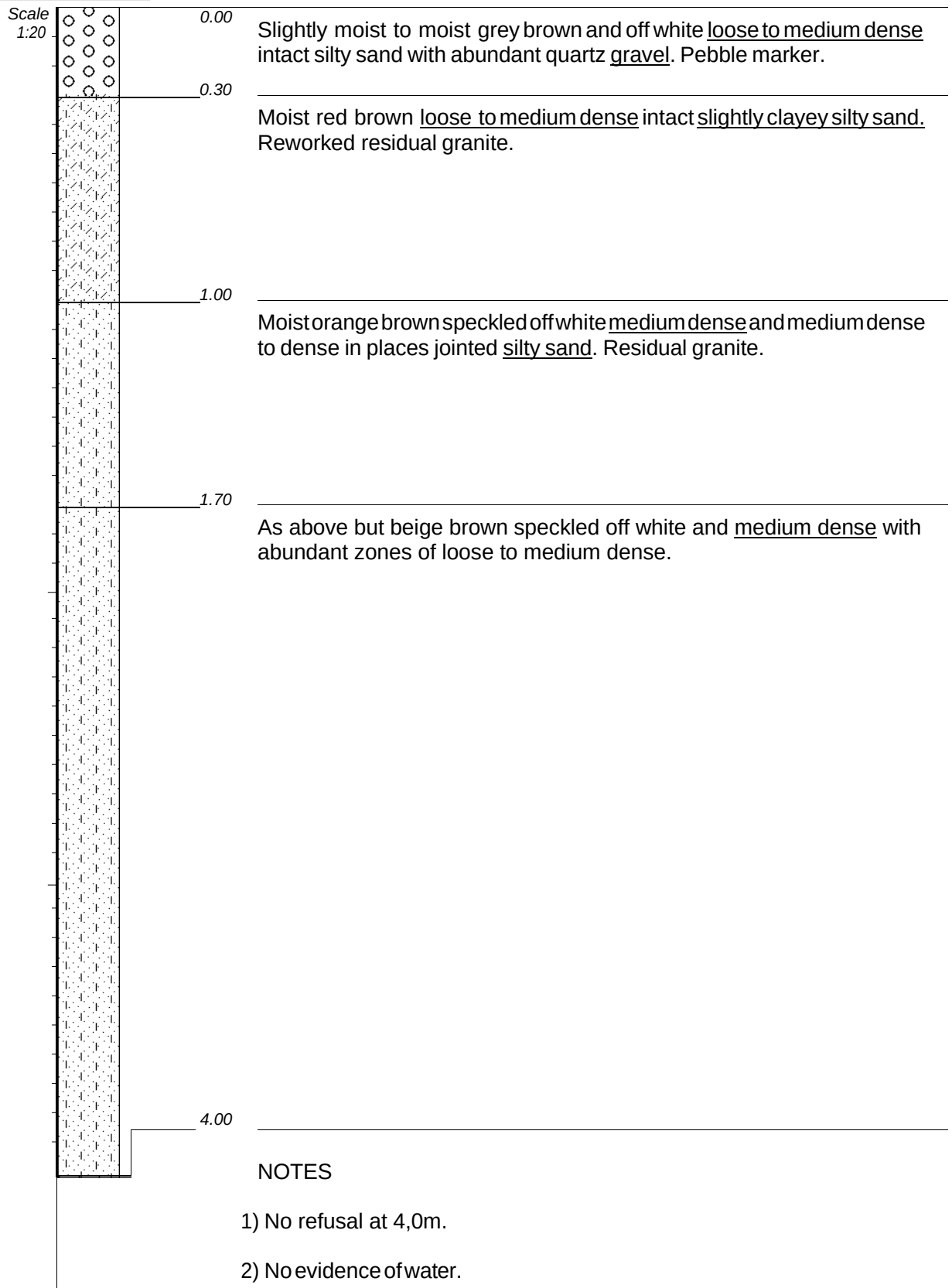
- 1) No refusal at 4,0m.
- 2) No evidence of water.

CONTRACTOR :
MACHINE: JCB 200 SC Excavator
DRILLED BY :
PROFILED BY : Justin can Huysteen
TYPE SET BY : Renee
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 18/06/2015
DATE : 24/06/2015 11:54
TEXT : ..05TPWoodmeadReservoir.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP2**

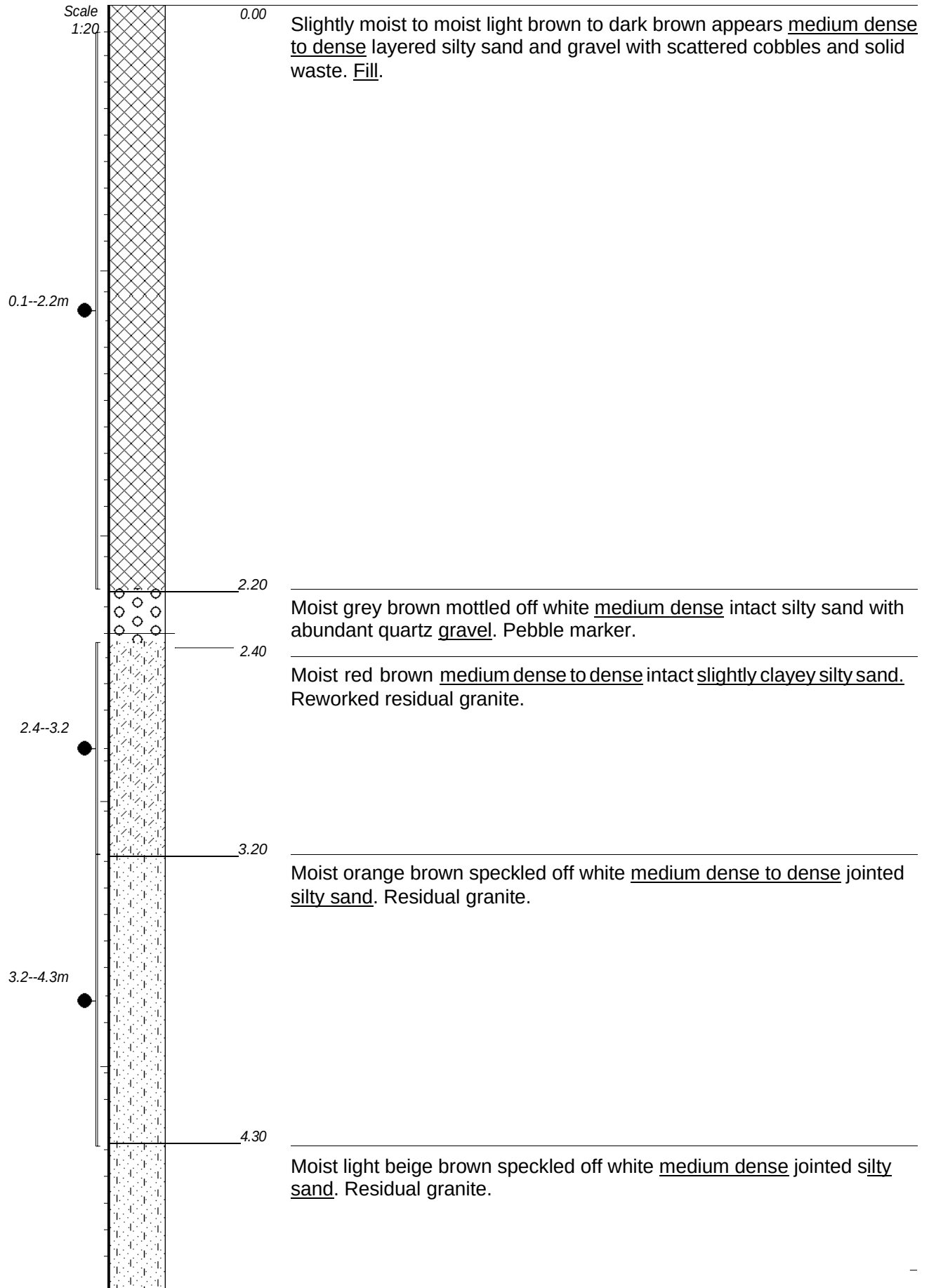


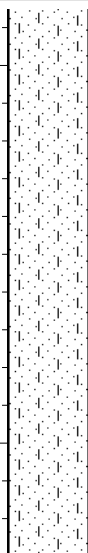
CONTRACTOR :
MACHINE: JCB 200 SC Excavator
DRILLED BY :
PROFILED BY : Justin can Huysteen
TYPE SET BY : Renee
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 18/06/2015
DATE : 24/06/2015 11:54
TEXT : ..05TPWoodmeadReservoir.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP3**





6.30

NOTES

- 1) No refusal at 6,3m.
- 2) No evidence of water.
- 3) Disturbed sample taken at 0,1--2,2m, 2,4--3,2 and 3,2--4,3m.

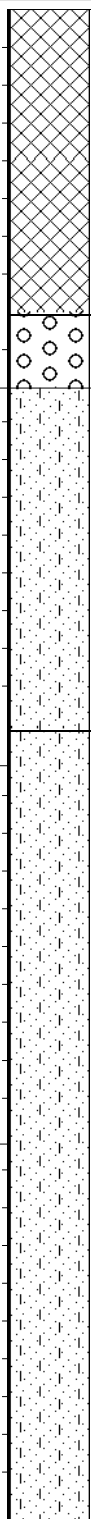
CONTRACTOR :
MACHINE: JCB 200 SC Excavator
DRILLED BY :
PROFILED BY : Justin van Huysteen
TYPE SET BY : Renee
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 18/06/2015
DATE : 24/06/2015 11:54
TEXT : ..05TPWoodmeadReservoir.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP4**

Scale
1:20



0.00

Slightly moist to moist light brown medium dense to dense layered silty sand and gravel with scattered builders rubble and solid waste. Fill.

0.80

Moist greyish brown and off white medium dense intact silty sand with abundant quartz gravel. Pebble marker.

1.00

Moist reddish brown medium dense to dense intact silty sand. Reworked residual granite.

1.90

Moist orange brown to olive brown speckled off white medium dense to dense and dense in places jointed silty sand. Residual granite.

4.00

NOTES

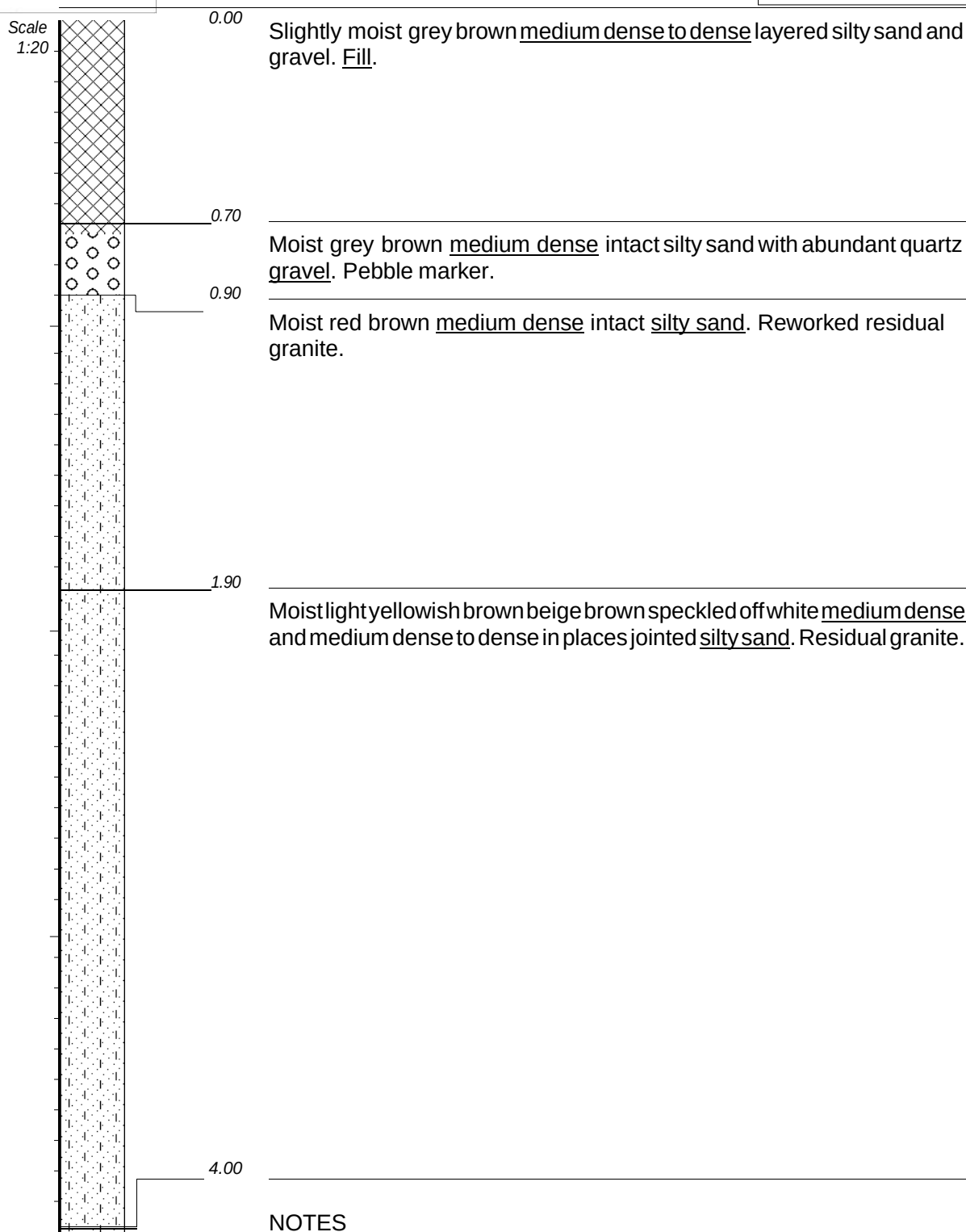
- 1) No refusal at 4,0m.
- 2) No evidence of water.

CONTRACTOR :
MACHINE: JCB 200 SC Excavator
DRILLED BY :
PROFILED BY : Justin can Huysteen
TYPE SET BY : Renee
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 18/06/2015
DATE : 24/06/2015 11:54
TEXT : ..05TPWoodmeadReservoir.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP5**



- 1) No refusal at 4.0m.
- 2) No evidence of water.

CONTRACTOR :
MACHINE: JCB 200 SC Excavator
DRILLED BY :
PROFILED BY : Justin van Huysteen
TYPE SET BY : Renee
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 18/06/2015
DATE : 24/06/2015 11:54
TEXT : ..05TPWoodmeadReservoir.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP6**

