



Contract JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH



TENDER COVER PAGE

MBD 1

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF JOHANNESBURG WATER

BID NUMBER: JW 14402

CLOSING DATE: 17 FEBRUARY 2026

CLOSING TIME: 10:30 AM

DESCRIPTION: TURFFONTEIN CORRIDORS OF FREEDOM – WATER UPGRADE (FORESTHILL TOWER AND PUMSTATION)

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

BRIEFING SESSION	COMPLUSARY YES
BRIEFING DETAILS	DATE AND TIME: 04 DECEMBER 2025 AT 10:00 AM ADDRESS : SITE - 418 RIFLE RANGE ROAD ON ERF 68, TURFFONTEIN, JOHANNESBURG, 2001 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		CIDB No	

EMPLOYER INFORMATION

DEPARTMENT	JW - PMU	DEPARTMENT	SCM
CONTACT PERSON	Lebea Rakobo	CONTACT PERSON	Nthabiseng Matabane
TELEPHONE NUMBER	011 688 1524	TELEPHONE NUMBER	011 688 1512
E-MAIL ADDRESS	lebea.rakobo@jwater.co.za	E-MAIL ADDRESS	Nthabiseng.matabane@jwater.co.za



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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 – NON-SUBMISSION OF ELECTRONIC COPY AND MEMORY STICK/USB WILL NOT LEAD TO DISQUALIFICATION).**

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:



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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 A PERMANENT ESTABLISHMENT IN THE RSA? | ☐ YES ☐ NO |
| 3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? | ☐ YES ☐ NO |
| 3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? | ☐ YES ☐ NO |

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

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.



**TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH**



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. JW 14402: TURFFONTEIN CORRIDORS OF FREEDOM – WATER UPGRADE
(FOREST HILL TOWER AND PUMP STATION), JOHANNESBURG SOUTH

The tender document will be available in the form of a download from the Johannesburg Water website
(<https://www.johannesburgwater.co.za/scm/supply-chain/tenders/all-open-tenders/>) starting from 18
November 2025

The Employer is Johannesburg Water

All tenders and supporting documents must be submitted in a sealed envelope and be placed in the
Tender box on the ground floor of the Johannesburg Water offices by no later than 10:30 am on 17
February 2026.

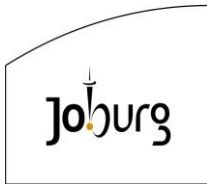
Address is as follows:

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.



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Volume 1 Tender and Contract
Section T1 Tender and Contract



Johannesburg Water SOC Ltd



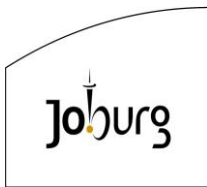
CONTRACT NO: JW14402

**TURFFONTEIN CORRIDORS OF FREEDOM –
WATER UPGRADE (FOREST HILL TOWER AND
PUMP STATION)**

JOHANNESBURG SOUTH

VOLUME 1

TENDER AND CONTRACT



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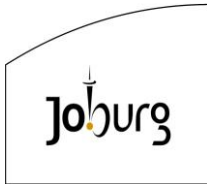
The Tenderer is to indicate in the “Submitted (Yes/No)” column in the below table that they have completed the required section of the tender document. Completion of this checklist will assist the Tenderer in ensuring that they have attended to all the required items for submission with this tender. 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 T2.2.4. 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 a CIDB Active Status at the requested CIDB requirement at evaluation stage 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.		•		
2	Mandatory Documents at Particular Stage:				
	CIDB grading of 8CE and higher. Active Status at the required CIDB grading or higher at the time of Evaluation	•			
	Mandatory Tender Briefing Meeting	•			
	Complete and sign the Form of Offer	•			
T2.3.3					

Employer:		Contractor:	
Witness:		Witness:	

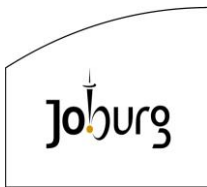


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Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
3	Administrative Documentation:				
T2.1.1	Record of Addenda to Tender Documents	•			
T2.1.2	Signed Certificate of Authority to Sign	•	•		
T2.1.3	Compulsory Enterprise Questionnaire	•			
	MBD 1 - Invitation to Bid - Completed and signed	•	•		
	Central Supplier Database Registration	•			
T2.1.4	MBD 4 - Declaration of interest - Completed and signed	•	•		
T2.1.4	MBD 5 - Declaration for procurement above R10 Million (all applicable taxes included) - Completed and signed.	•	•		
T2.1.4	MBD 6.1 - Preference Points Schedule – Specific Goals and Price Points - Completed and signed.	•			
T2.1.4	MBD 8 - Bidder's past supply chain management practices – Completed and signed.	•	•		
T2.1.4	MBD 9 - Certificate of Independent Bid Determination – Completed and signed.	•	•		
	Municipal Rates and Taxes for the Company - Current municipal rates for the company 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.	•	•		

Employer:		Contractor:	
Witness:		Witness:	

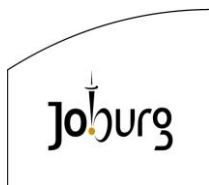


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Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	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 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.	•	•		
T2.1.5	Proposed Amendments and Qualifications	•			
T2.3.4	Imported Content Sheet: Forward Exchange Cover for Imported	•			
4.	Functionality Documentation:				
	Documentary Evidence Required for Criteria 1 (Contactable Reference Letters and Completion / Final Approval Certificates and appointment letter)	•			
	Documentary Evidence Required for Criteria 2 (Contactable Reference Letters and Completion / Final Approval Certificates and appointment letter)	•		•	
	Documentary Evidence Required for Criteria 3 Contactable Reference Letters and Completion / Final Approval Certificates and appointment letter)	•		•	
	Documentary Evidence Required for Criteria 4 (CV, qualifications, and valid registration)	•		•	

Employer:		Contractor:	
Witness:		Witness:	

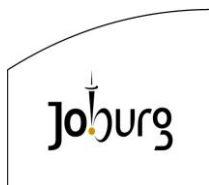


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Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	Documentary Evidence Required for Criteria 5 (CV, qualifications)	•		•	
	Documentary Evidence Required for Criteria 6 (CV, qualifications)	•		•	
	Documentary Evidence Required for Criteria 7 Quality Control Plan Standard OR ISO 9001 certification	•		•	
	Documentary Evidence Required for Criteria 8 (CV, qualifications, and valid registration)	•		•	
5.	Specific Goals:				
	Documentary Evidence Required for Criteria 1 – (Valid Construction Sector 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)	•			
	Documentary Evidence Required for Criteria 2 – (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 for Criteria 3 – (Valid Construction Sector 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)	•			
6.	Scope of Work:				
	Scope of Work and Specifications	•			
7.	Pricing Schedule:				
	Bill of Quantities/ Schedule of Quantities. completed	•			
	Alterations authenticated – Refer to Acknowledgment of Tender Conditions	•			

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)
8.	Site Information:				
	Site Information	•			
9.	Occupational Health, Safety and Environmental Specification				
T2.3.1	Acknowledgement of SHE Specification & Annexures	•			
10.	Tender Drawings:				
T2.3.2	Acknowledgement of Project Tender Drawings	•			
11.	Terms and Conditions:				
	General Conditions of Contract	•			
	Tender Data	•			
	Pricing Data	•	•		
12.	Other Documents				
	Form of Acceptance (do not complete Form of Acceptance it will be completed by JW official)				
	Public Liability Insurance			•	
	Insurance of Works			•	
	Common Law Liability Insurance			•	
	Insurance of Construction Plant and Equipment			•	
	Valid Registration with Compensation for Occupation Injuries and Diseases Act			•	
	Performance Guarantee			•	
	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, and preference points for specific goals. 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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CONTRACT 1
Volume 1 Tender and Contract
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Johannesburg Water (SOC) Ltd



CONTRACT NO: JW14402

TURFFONTEIN CORRIDORS OF FREEDOM –
WATER UPGRADE (FOREST HILL TOWER AND PUMP
STATION)

VOLUME 1

PART 1: TENDERING PROCEDURES



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Witness:		Witness:	



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Volume 1 Tender and Contract
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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 document 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, including the Enterprise Declaration Affidavit which may be bound in a separate volume. T2.2: List of Other Returnable Documents T2.3: List of Other Returnable Schedules Contract Part 1: Agreement and Contract Data C1.1: Form of Offer and Acceptance C1.2: Contract Data C1.3: Forms of Securities

Employer:		Contractor:	
Witness:		Witness:	



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Clause Number	Tender Data
	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 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: Contact Person: Lebea Rakobo Telephone: 011 688 1524 E-mail address: lebea.rakobo@jwater.co.za The SCM representative is: Contact Person: Nthabiseng More Telephone: 011 688 1512 E-mail address: nthabiseng.matabane@jwater.co.za

Employer:		Contractor:	
Witness:		Witness:	



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Clause Number	Tender Data
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 the 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 gradings 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.2.8	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.2.10.5	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 considered to be covered by the other prices in the Schedule.”

Employer:		Contractor:	
Witness:		Witness:	



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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 on 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. 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.2.13.3	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)

Employer:		Contractor:	
Witness:		Witness:	



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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: 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 date and time of the tender, as well as the Tenderer's name, their Authorised Representative's name, postal address and telephonic contact numbers.
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 150 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.2.19	The Tenderer must provide access during working hours to his premises for inspections on request.
C.2.23	The Tenderer is required to submit with his tender: 1) Valid SARS Compliance status Pin for Tenders issued by the South African Revenue Services. 2) Proof of CSD registration i.e. MA number 3) A Certificate of Contractor Registration issued by the CIDB. 4) where the tendered amount inclusive of VAT exceeds R 10 million: i. audited annual financial statement for 3 years, or for the period since establishment if established during the last 3 years, if required by law to prepare annual financial statements for auditing.

Employer:		Contractor:	
Witness:		Witness:	



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	ii. if the bidder is not required by law to prepare financial statements, then the bidder is required to submit their unaudited financial statements prepared by an independent accounting professional. 5) Proof that the tenderer and directors of the tenderer are not in arrears for more than 90 days with municipal rates and taxes and municipal service charges, The latest municipal account is to be attached, or a signed copy of the valid lease agreement if the tenderer or director of the tenderer is currently leasing premises and not responsible for paying municipal accounts. i. Should the municipal statement that was submitted with the tender document before tender closing date and time be in arrears for more than 90 days at time of award, the tenderer will be requested to submit the latest municipal statement which shows that the tenderer is not in arrears for more than 90 days. If the statement at that time is in arrears for more than 90 days, the tenderer must submit before the stipulated deadline, the written proof of an approved arrangement with the municipality. ii. The proof may be a copy of the agreement or an updated municipal statement which reflects the arrangement. iii. Should this tender be considered for award of the contract, based on proof of submission and should proof of such submission be found to be invalid, erroneous or inaccurate, the tenderer will no longer be considered for the award of the contract. iv. Statement must not be older than 90 days from the closing date of this tender. Attach latest municipal account statement behind this page. v. In cases where the director of the tenderer resides with their spouse, parent, partner or sibling the owner of the property that confirm where the director of the tenderer resides must submit an affidavit stating such and explaining the relationship. This would happen in the case where the submitted municipal statement or lease agreement is not in the name of the director of the tenderer. Point (i) will be applicable. vi. In cases where the business address of the tenderer is also the official residence of the director of the tenderer, the director of the tenderer must submit an affidavit stating such. Proof that the municipal statement is not in arrears for more than 90 days or a valid lease agreement must be submitted. Point (i) will be applicable. Where a tenderer satisfies CIDB contractor grading designation requirements through joint venture formation, such tenderers must submit the Certificates of Contractor Registration in respect of each partner.
C.2.24	Add the following new clause: “Canvassing and obtaining of additional information by tenderers.

Employer:		Contractor:	
Witness:		Witness:	



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	Accept that: i) 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. ii) 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. ii) a member of the board of directors of any municipal entity. iii) an official of any municipality or municipal entity. iv) an employee of any national or provincial department. v) provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999). vi) a member of the accounting authority of any national or provincial public entity; or vii) an employee of Parliament or a provincial legislature." In order 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;

Employer:		Contractor:	
Witness:		Witness:	



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	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: i) 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 and preference points for specific goals. ii) Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. iii) In cases where locality is a specific goal and the bidder 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) calendar 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
C.3.9	Replace Existing Clause Arithmetic Errors

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Witness:		Witness:	



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	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 bidder 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 is pricing discrepancies, errors are highlighted and identified corrections are explained.

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Witness:		Witness:	



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	Tenderer is afforded an opportunity to provide clarification, accept or reject identified corrections in writing. (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.																														
C.3.11	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>Followed by</td><td>Preferential Procurement Goals and Pricing Evaluation</td></tr></table> Stage 1: Mandatory Evaluation <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 8CE 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>Mandatory Tender 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></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	Followed by	Preferential Procurement Goals and Pricing Evaluation	Description		Complied		No	Description	Yes	No	1	CIBD grading 8CE or higher. Active Status at the required CIBD grading or higher at the time of Evaluation			2	Mandatory Tender Briefing Meeting			3	Form of Offer Completed and Signed		
Stage	Description																														
Stage 1	Mandatory Evaluation																														
Stage 2	Administrative Evaluation																														
Stage 3	Technical Evaluation																														
Followed by	Preferential Procurement Goals and Pricing Evaluation																														
Description		Complied																													
No	Description	Yes	No																												
1	CIBD grading 8CE or higher. Active Status at the required CIBD grading or higher at the time of Evaluation																														
2	Mandatory Tender Briefing Meeting																														
3	Form of Offer Completed and Signed																														

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	<u>Stage 2: Administrative Evaluation</u>				
	Description			Complied	
	Reference	Description	Requirement	Yes	No
	T2.1.1	Record of Addenda to Tender Documents	Complete and submit complete and signed Form		
	T2.1.2	Signed Certificate of Authority to Sign or signed board resolution	Completed and signed certificate of authority to sign or signed board resolution		
	T2.2.2	SARS Tax Compliance Status Pin and Proof of CSD registration	Complete and submit complete and signed Form plus attachment		
	T2.3.4	Imported Content Sheet: Forward Exchange Cover for Imported	Complete and submit complete and signed Form		
	MBD 1	Invitation to Bid	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 signed MBD 4 Form		
	MBD 5	Declaration for procurement above 10 million (all applicable taxes included)	Complete and submit signed MBD 5 Form		
	MBD 6.1	Preference Points Claim in Terms of The Preferential Procurement Regulations 2022	Complete and submit signed MBD 6.1 Form		
	MBD 8	Declaration of bidder's past supply chain management practices	Complete and submit signed MBD 8 Form		
	MBD 9	Certificate of Independent Bid Determination	Complete and submit signed MBD 9 Form		
	Annexure – Proof of Specific Goals	Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency or DTI/CIPC BBBEE Certificate for Exempted Micro Enterprises or Affidavit sworn under oath, OR	Submit applicable documentation with the tender submission		

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		CIPC registration document showing percentage of ownership and share certificate where applicable			
	Annexure – Proof of Specific Goals	Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address	Submit applicable documentation with the tender submission		
	Annexure	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	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	3-year financial statements (audited where applicable)	Submit applicable documentation with the tender submission		
	Annexure	Joint Venture Consortium or equivalent Agreement signed by all parties, where applicable	Where applicable, submit applicable documentation with the tender submission		
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 and preference points for specific goals. Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. Any document or form submitted or completed upon request (was not included in the initial tender submission before the closing date) will not be used to claim points for specific goals. <u>Stage 3: Technical Evaluation</u>					

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Witness:		Witness:	



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	Tenderers who FAIL to meet the minimum required score or requirements of tender will be disqualified. The criteria maximum points in respect of each of criterion shall be as follows:					
	NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE
	1.	Tenderers Experience with Respect to Construction of Elevated Reinforced Concrete water retaining structure (Tower) of 1ML capacity or more. Or Construction of Reinforced Concrete water retaining structure (Reservoir) of 6ML capacity	Supporting Documents Required include Reference Letters as per T2.1.7 (Or on Client Letter Head with all required Information) and Completion / Approval Certificates 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. Appointment letters from the client outlining the scope of work for	Number of Elevated Reinforced Concrete Tower of 1ml or More Completed.	Tenderer Has not Completed any Project	0
				OR Number of Reinforced Concrete Water Retaining Structure	Tenderer Has Completed at Least 2 Project. (Either reinforced concrete Tower or reinforced concrete Reservoir)	25
					Tenderer has completed both (2 concrete Towers and concrete Reservoir). Or	30

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			the contractor, either main contractor or sub-contractor. If the completed project was executed as a subcontract, the reference letter must be accompanied by the Main Contractor's completion certificate, in addition to the bidder's own completion certificate. The quality of works must be certified by the client's Engineer. 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. All Subcontracted work will be verified with the relevant client.	(Reservoir) of 6ml or More Completed	Tenderer has completed 3 or more reinforced concrete Towers.		

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Witness:		Witness:	



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2.	Tenderers Experience with Respect to Construction of Pump Stations projects each with a minimum flow of 233l/s or more.	Supporting Documents Required include Reference Letters as per T2.1.7 (Or on Client Letter Head with all required Information) and Completion / Approval Certificates. Note: <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. Appointment letters from the client outlining the scope of work for the contractor, either main contractor or sub-contractor. If the completed project was executed as a subcontract, the reference letter must be accompanied by the Main</i>	Number of Pump Stations Projects Each with a Minimum Flow Of 233 l/s.	0 Completed Projects	25	0									
				1 - 3 Completed Projects		23									
				>3 Completed Projects		25									
<table><tr><td>Employer:</td><td></td><td>Contractor:</td><td></td></tr><tr><td>Witness:</td><td></td><td>Witness:</td><td></td></tr></table>								Employer:		Contractor:		Witness:		Witness:	
Employer:		Contractor:													
Witness:		Witness:													

Employer:		Contractor:	
Witness:		Witness:	



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			Contractor's completion certificate, in addition to the bidder's own completion certificate. The quality of works must be certified by the client's Engineer. 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. All Subcontracted work will be verified with the relevant client.				

Employer:		Contractor:	
Witness:		Witness:	



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	3.	Tenderers Experience with Respect to Construction of Steel Pipe Projects	Supporting Documents Required include Reference Letters as per T2.1.7 (Or on Client Letter Head with all required Information) and Completion / Approval Certificates. Note: <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. Appointment letters from the client outlining the scope of work for the contractor, either main contractor or sub-contractor. If the completed project was executed as a subcontract, the reference letter must be accompanied by the Main</i>	Number of Completed Steel Pipe Projects of Diameter 450mm or More and Construction Cost of R15 Million or More and Inclusive of Cathodic Protection	0 Completed Projects	0
					1 - 2 Completed Projects	23
					>2 Completed Projects	25

Employer:		Contractor:	
Witness:		Witness:	



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			<i>Contractor's completion certificate, in addition to the bidder's own completion certificate. The quality of works must be certified by the client's Engineer. 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> <i>All Subcontracted work will be verified with the relevant client..</i>				
4.		Post Qualification Experience of Contract Manager	Tender must Provide CV of Contract Manager in the format given on T2.1.9 Note: Tenderers may provide their own	Number of Projects Involving construction of Water Retaining	0 Completed Project	5	0

Employer:		Contractor:	
Witness:		Witness:	



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		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. However, the time of registration of Contract Manager will not impact post qualification number of projects.	CVs but information provided should contain all information in T2.1.9 Note: Certified Copy of qualifications to accompany the CVs	Structures (2 Elevated Reinforced Concrete Tower or Reinforced Concrete Reservoirs) And Construction Of Pump Station and Bulk Steel Pipe Work Completed)			
					1 - 3 Completed Projects		2
					>3 Completed		5

Employer:		Contractor:	
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	5.	Post Qualification Experience of Site Personnel Site Manager with qualifications of National Diploma (Civil or Structural) Engineering or more and Registered as a Candidate Professional in the Built Environment or more will be considered.	Tender must Provide CV of Site 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> <i>Note: Certified Copy of qualifications to accompany the CVs</i>	Number of Projects Involving construction of Water Retaining Structures (2 Elevated Reinforced Concrete Tower or Reservoirs). And Construction of Pump Station and Bulk Steel Pipe Work Completed as Site Agent / Site Manager)	0 Completed Projects	5	0
					1 - 3 Completed Projects		3
					>3 Completed Projects		5

Employer:		Contractor:	
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	6.	Post Qualification Experience of Safety Officer Only Safety Officers with qualifications of National Diploma (Safety Management)/ (Environmental Health/Environmental Science/ Environmental Management), SAMTRAC / SHEOMTRAC/ SHEMTRAC /	Tender must Provide CV of Safety Officer in the format given on T2.1.9 All Civil Related projects will be considered. <i>Note: Certified Copy of qualifications to accompany the CVs</i>	Number Of Civil/Structural Engineering Projects Completed As Safety Officer	1 Completed Project	5	0
					2 - 3 Completed Projects		2
					>3 Completed Projects		5

Employer:		Contractor:	
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		MESHTRAC /NEBOSH / Safety Officers Course (NQF 5) 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.					
7.		Foreman/ Supervisor with qualifications of National Diploma (Electrical/Mechanical) Engineering or more and Registered as a Candidate	Tender must Provide CV of Site Foreman or Supervisor in the format given on T2.1.9 <i>Note: Tenderers may provide their own</i>	Construction of Pump Station and As Foreman / Supervisor / Resident Engineer/ Site Engineer	0 Completed Projects		0
					1 - 3 Completed Projects		2

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Claus e No.	Tender Data					
		Professional in the Built Environment or more will be considered.	CVs but information provided should contain all information in T2.1.9 Note: Certified Copy of qualifications to accompany the CVs		>3 Completed Projects	5
				MINIMUM QUALIFYING SCORE		80
				MAXIMUM QUALIFYING SCORE		100
	Tenderers who fail to achieve a minimum overall score of 80 points, , will not be considered further.					

Employer:		Contractor:	
Witness:		Witness:	



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Volume 1 Tender and Contract
Section T1 Tender and Contract

Clause No.	
	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, Senior Foremen 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. Acronyms ECSA: Engineering Council of South Africa

Employer:		Contractor:	
Witness:		Witness:	



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Clause No.	<u>Tender Data</u>
	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

Employer:		Contractor:	
Witness:		Witness:	



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**Volume 1 Tender and Contract
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Clause number	Tender Data								
C.3.11.2 & C.3.11.3	The procedure for the evaluation of responsive tenders is Method 2 (Financial Offer and Specific Goals): 1. APPLICATION OF THE PREFERENCE POINTS SCORING SYSTEM <u>The following preference point systems are applicable to all bids:</u> - the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included). - The Specific Goals for the tender will be stated in MBD 6.1. In MBD 6.1, the tenderer must indicate how many points they are claiming for each Specific Goal and must submit all the required supporting documentation for the points to be verified and awarded by JW. JW will evaluate the submitted supporting documentation and confirm Specific Goal points claimed by the tenderer. Specific goals to be allocated by the Bid Evaluation Committee will depend on verification documentation submitted. - Only tenderers that have completed and signed MBD 6.1 and submitted applicable verification documents will be allocated Specific Goal points for preferencing. (a) The value of this bid is estimated to exceed R50 000 000 (all applicable taxes included) and therefore the 90/10 preference point system shall be applicable. (b) Preference points for this bid shall be awarded for: Price; and Specific Goals. (c) The maximum points for this bid are allocated as follows: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Description</th><th>Points</th></tr> </thead> <tbody> <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 must not exceed</td><td>100</td></tr> </tbody> </table> (d) Failure on the part of a bidder to submit proof of specific goals points claimed in MBD 6.1 will not result in disqualification but will result in points not being awarded for Specific Goals. Specific Goals 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 must be supported by proof/ documentation stated in the conditions of this tender.	Description	Points	Price	90	Specific goals	10	Total points for Price and Specific Goals must not exceed	100
Description	Points								
Price	90								
Specific goals	10								
Total points for Price and Specific Goals must not exceed	100								

Employer:		Contractor:	
Witness:		Witness:	



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**TURFFONTEIN CORRIDORS OF FREEDOM – WATER
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Clause number	Tender Data
	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: I. 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: I. 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)

Employer:		Contractor:	
Witness:		Witness:	



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Clause number	Tender Data
	• Promotion of enterprises located in the City of Johannesburg municipality • Promotion of enterprises located rural or underdeveloped areas or townships. Qualifying Small Enterprises (QSE) I. Promotion of procurement from QSE's that are black owned. Exempted Micro Enterprises (EME): I. Promotion of procurement from EME's that are black own. SUB-CONTRACTING: Promotion of sub-contracting a Historically Disadvantaged Individuals (HDI) company. 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

Employer:		Contractor:	
Witness:		Witness:	



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Clause number	Tender Data																		
	Table 1: <table> <tr> <th>The specific goals allocated points in terms of this tender</th><th>Number of points allocated (90/10 system)</th></tr> <tr> <td>Businesses located within the boundaries of COJ municipality</td><td>4</td></tr> <tr> <td>Business owned by 51% or more-Women</td><td>3</td></tr> <tr> <td>Business owned by 51% or more- by Black Youth</td><td>3</td></tr> <tr> <td>Total</td><td>10</td></tr> </table> The following verification documents must be submitted with the tender document: <table> <tr> <th>Specific Goals – anyone or a combination of any</th><th>Means of verification that may be selected or a combination thereof</th></tr> <tr> <td>Business owned by 51% or more -Black Youth</td><td>Valid Construction Sector 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</td></tr> <tr> <td>Business owned by 51% or more-Women</td><td>Valid Construction Sector 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</td></tr> <tr> <td>Businesses located within the boundaries of COJ municipality</td><td>Proof of municipal account / valid lease agreement, letter from the Ward Council/ landlord confirming the business address. Businesses that operate from personal properties are required to submit an affidavit OR Valid and signed Confirmation of lease indicating the address.</td></tr> </table> Note: The joint venture, consortium, or equivalent agreement in order for JW to determine the proportional points for specific goals. Example, If there are two parties in a Joint Venture with a 50:50 ownership of the Joint Venture and one party is located within the boundaries of COJ and one is located in Tshwane, if one of the goals is locality and has total points of 4, the JV will only be entitled the proportional points of 2.	The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system)	Businesses located within the boundaries of COJ municipality	4	Business owned by 51% or more-Women	3	Business owned by 51% or more- by Black Youth	3	Total	10	Specific Goals – anyone or a combination of any	Means of verification that may be selected or a combination thereof	Business owned by 51% or more -Black Youth	Valid Construction Sector 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	Business owned by 51% or more-Women	Valid Construction Sector 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	Businesses located within the boundaries of COJ municipality	Proof of municipal account / valid lease agreement, letter from the Ward Council/ landlord confirming the business address. Businesses that operate from personal properties are required to submit an affidavit OR Valid and signed Confirmation of lease indicating the address.
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Total	10																		
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Businesses located within the boundaries of COJ municipality	Proof of municipal account / valid lease agreement, letter from the Ward Council/ landlord confirming the business address. Businesses that operate from personal properties are required to submit an affidavit OR Valid and signed Confirmation of lease indicating the address.																		

Employer:		Contractor:	
Witness:		Witness:	



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Volume 1 Tender and Contract
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Clause number	Tender Data																																																																																											
	The following are the requirements for a valid Sworn Affidavit in terms of the BBBEE Sector Codes of Good Practise: <table><tr><th>Affidavit Prescribed Formats</th><th>Category</th><th>Financial Threshold</th></tr><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><tr><td colspan="3">Financial Sector Code</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">Information Communication Technology Sector Code (ICT)</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">Marketing, Advertising & Communication Sector Code (MAC)</td></tr><tr><td>> Public Relations</td><td>BO QSE</td><td>Between R5m and R10m</td></tr><tr><td>> Marketing, Advertising & Communications</td><td>BO EME</td><td>Less than R5m</td></tr><tr><td colspan="3">Property Sector Code</td></tr><tr><td rowspan="2">> Service-based</td><td>BO QSE</td><td>Between R5m and R10m</td></tr><tr><td>EME</td><td>Less than R5m</td></tr><tr><td>> Agency-based</td><td>BO QSE</td><td>Between R2.5m and R35m</td></tr><tr><td rowspan="2">> Asset-based</td><td>EME</td><td>Less than R2.5m</td></tr><tr><td>BO QSE</td><td>Between R80m and R400m</td></tr><tr><td colspan="3">Tourism Sector Code</td></tr><tr><td></td><td>BO QSE</td><td>Between R5m and R45m</td></tr><tr><td></td><td>BO EME</td><td>Less than R5m</td></tr><tr><td colspan="3">Specialised 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></table> Note: A sworn affidavit received from a tenderer that does not meet the above requirement will not be considered for the allocation of points for specific goals.	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	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
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Employer:		Contractor:	
Witness:		Witness:	



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UPGRADE (FOREST HILL TOWER AND PUMP STATION),
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TENDERING DATA



Volume 1 Tender and Contract
Section T1 Tender and Contract

Clause number	Tender Data
	Requirements for a valid BBBEE Certificate are as follows: a) Copy of a certified valid BBBEE certificate (Only Valid BBBEE accredited by SANAS), or a valid Sworn Affidavit issued by the DTIC or the CIPC or in a similar format complying with commissioner of oath Act. b) Bidders who do NOT qualify as EME's and QSE's as outlined above must submit B-BBEE verification certificates that are issued by an Agency accredited by SANAS. c) 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 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. Note: A tenderer failing to submit proof of specific goals claimed as per indicated above will not be disqualified but will be allocated zero points for specific goals and will be allocated points for pricing. 2. 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;.

Employer:		Contractor:	
Witness:		Witness:	



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Volume 1 Tender and Contract
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Clause number	Tender Data
	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. 3. POINTS AWARDED FOR PRICE THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS A maximum of 90 points is allocated for price on the following basis: 90/10 $Ps = 90 \left(1 - \frac{Pt - Pmin}{Pmin} \right)$ Where Ps = Points scored for comparative price of bid under consideration Pt = Comparative price of bid under consideration Pmin = Comparative price of lowest acceptable bid
C.3.12	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.3.13.1	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 i.e., MA xxxxx number;

Employer:		Contractor:	
Witness:		Witness:	



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UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH
TENDERING DATA

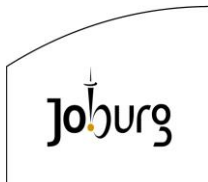


Volume 1 Tender and Contract
Section T1 Tender and Contract

Clause number	Tender Data
	c) the tenderer submits a letter of intent from an approved insurer undertaking to provide the Demand 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
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: JW14402

**TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP
STATION),
JOHANNESBURG SOUTH**

VOLUME 1

**RETURNABLE DOCUMENTS
AND
SCHEDULES**

Employer:		Contractor:	
Witness:		Witness:	



Contract JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP STATION),
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Volume 1 Tender and Contract
Returnable Documents



The tenderer must complete the following returnable documents:

T2.1 LIST OF RETURNABLE DOCUMENTS

Returnable Schedules required for tender evaluation purposes

<u>Document</u>	<u>Page No.</u>
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 2022	RD.13
MBD 4 DECLARATION OF INTEREST	RD.20
MBD 8 DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES	RD.23
MBD 5 DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)	RD.25
	RD.28
MBD 9 CERTIFICATE OF INDEPENDENT BID DETERMINATION	
T2.1.5 Proposed Amendments and Qualifications	RD.31
T2.1.6 Schedule of the Tenderer's Experience	RD.32
T2.1.7 Contactable Reference	RD.33
T2.1.8 Schedule of Key Personnel	RD.35
T2.1.9 Curriculum Vitae of Key Personnel	RD.37

T2.2 LIST OF OTHER RETURNABLE DOCUMENTS

Other documents required only for tender evaluation purposes

<u>Document</u>	<u>Page No.</u>
T2.2.1 Contractor's Certificate of Registration With CIDB	RD.50
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration	RD.51

T2.3 LIST OF RETURNABLE SCHEDULES

Other documents that will be incorporated into the contract

<u>Document</u>	<u>Page No.</u>
T2.3.1 Returnable Annexure A: Acknowledgement of SHE Specification &	RD.53
T2.3.2 Returnable Annexure B: Acknowledgment of Tender Drawings	RD.54
T2.3.3 Minutes of the Mandatory Tender Briefing	RD.55
T2.3.4 Imported Content Sheet: Forward Exchange Cover for Imported	RD.56

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.*

Employer:		Contractor:	
Witness:		Witness:	



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Returnable Documents



T2.1 LIST OF RETURNABLE DOCUMENTS

Returnable Schedules required for tender evaluation purposes:

<u>Document</u>	<u>Page No.</u>
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
T2.1.5 Proposed Amendments and Qualifications	RD.31
T2.1.6 Schedule of the Tenderer's Experience	RD.32
T2.1.7 Contactable Reference	RD.33
T2.1.8 Schedule of Key Personnel	RD.35
T2.1.9 Curriculum Vitae of Key Personnel	RD.37

Employer:		Contractor:	
Witness:		Witness:	



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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:	



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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 CORPORATION	(III) PARTNERSHIP	(IV) JOINT VENTURE	(V) SOLE PROPRIETOR

(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. JW14402 and any contract resulting from it on behalf of the company.

Chairman:

As Witnesses: 1

2

Date:

Employer:		Contractor:	
Witness:		Witness:	



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(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:	



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(III) Certificate For Partnership

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

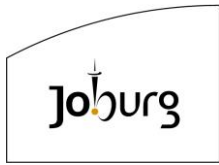
....., hereby authorize Mr/Ms

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:	



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(IV) Certificate For Joint Venture

This Returnable Schedule is to be completed by joint ventures.

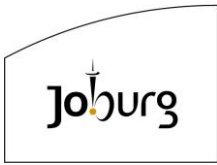
We, the undersigned, are submitting this tender offer in Joint Venture and hereby authorise
Mr/Ms, authorised signatory of the company.....

....., 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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(V) Certificate For Sole Proprietor

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

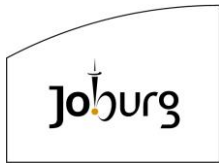
Signature of Sole Owner:

As Witnesses: 1

2

Date:

Employer:		Contractor:	
Witness:		Witness:	



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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 i.e. MA xxxxxxxx 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:

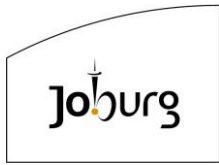
- | | |
|--|---|
| ☐ a member of any municipal council | ☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999) |
| ☐ a member of any provincial legislature | ☐ a member of 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 | |

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

Employer:		Contractor:	
Witness:		Witness:	



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

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

*insert separate page if necessary

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

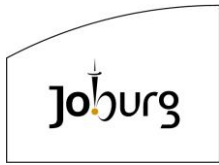
- i) authorizes the Employer to verify the tax compliance status from the South African Revenue Services that my / our tax matters are in order.
- ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or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

Signed: _____ Date: _____

Name: _____ Position: _____

Enterprise name: _____

Employer:		Contractor:	
Witness:		Witness:	



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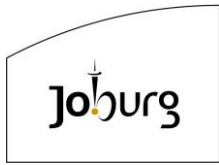
T2.1.4 PREFERENTIAL PROCUREMENT

Forms for Completion by the Tenderer included in this section are:

Form No.	Form Title	Description	Page No.
MBD 6.1	Preference Points Claim Form in Terms of the Preferential Procurement Regulations 2022	Procedures and adjudication criteria for the information of the Tenderer	RD.13
MBD 4	DECLARATION OF INTEREST	Form to be completed by the Tenderer	RD.20
MBD 8	DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES	Form to be completed by the Tenderer	RD.23
MBD 5	DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)	Form to be completed by the Tenderer	RD.25
MBD 9	CERTIFICATE OF INDEPENDENT BID DETERMINATION	Form to be completed by the Tenderer	RD.28

Note: All information supplied must be current and valid. Proposed or imminent changes to a Tenderer's status may be mentioned but the declarations must reflect current circumstances.

Employer:		Contractor:	
Witness:		Witness:	



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MBD 6.1

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

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

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

1. GENERAL CONDITIONS

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

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

1.2 To be completed by the organ of state

- a) 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.

1.4 To be completed by the organ of state:

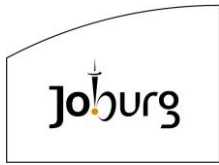
The maximum points for this tender are allocated as follows:

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

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

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

Employer:		Contractor:	
Witness:		Witness:	



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2. DEFINITIONS

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

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1 Points Awarded For Price

3.1.1 The 90/10 Preference Point Systems

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

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

Where

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

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

4.1 POINTS AWARDED FOR PRICE

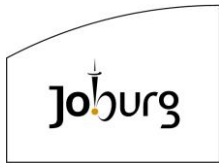
A maximum of 90 points is allocated for price on the following basis:

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

Where

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

Employer:		Contractor:	
Witness:		Witness:	



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5. POINTS AWARDED FOR SPECIFIC GOALS

5.1 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:

5.2 In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—

- (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or
- (b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,

then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

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

Note to 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)
Businesses located within the boundaries of COJ municipality	4	
Business owned by 51% or more-Women	3	
Business owned by 51% or more- by Black Youth	3	
Total	10	

Employer:		Contractor:	
Witness:		Witness:	



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6. DECLARATION WITH REGARD TO COMPANY/FIRM

6.1 Name of company/firm.....

6.2 Company registration number:

6.3 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

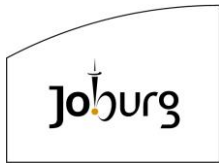
[TICK APPLICABLE BOX]

6.4 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:

- i) The information furnished is true and correct.
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form.
- iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct.
- iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –
 - (a) disqualify the person from the tendering process.
 - (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct.
 - (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation.
 - (d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
 - (e) forward the matter for criminal prosecution, if deemed necessary.

..... SIGNATURE(S) OF TENDERER(S)	
SURNAME AND NAME:	
DATE:	
ADDRESS:	

Employer:		Contractor:	
Witness:		Witness:	



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6.5 SUB-CONTRACTING

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

(Tick applicable box)

YES	☐	NO	☐
-----	--------------------------	----	--------------------------

6.5.2 If yes, indicate:

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

.....

.....

.....

.....

iii) The black sharehold 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 last 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		

Employer:		Contractor:	
Witness:		Witness:	



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6.6 DECLARATION WITH REGARD TO COMPANY/FIRM

6.6.1 Name of company/firm:

6.6.2 VAT number registration number:

6.6.3 Company registration number:

6.7 TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
☐ One person business/sole propriety
☐ Close corporation
☐ Company
☐ (Pty) Limited

[TICK APPLICABLE BOX]

6.8 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

.....

.....

.....

.....

6.9 COMPANY CLASSIFICATION

- ☐ Manufacturer
☐ Supplier
☐ Professional service provider
☐ Other service providers, e.g. transporter, etc.

[TICK APPLICABLE BOX]

Employer:		Contractor:	
Witness:		Witness:	



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6.10 MUNICIPAL INFORMATION

Municipality where business is situated:

Registered Account Number:

Stand Number:

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

6.12 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:

- i) The information furnished is true and correct;
- ii) 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;
- iii) 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

.....
.....

Employer:		Contractor:	
Witness:		Witness:	



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MBD 4

DECLARATION OF INTEREST

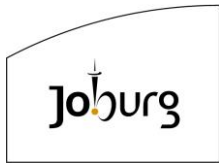
1. No bid will be accepted from persons in the service of the state¹.
2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting 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.

Employer:		Contractor:	
Witness:		Witness:	



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

3.9.1 If yes, furnish particulars

.....

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

3.10.1 If yes, furnish particulars

.....

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

3.11.1 If yes, furnish particulars

.....

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

3.12.1 If yes, furnish particulars

.....

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

3.13.1 If yes, furnish particulars

.....

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

3.14.1 If yes, furnish particulars:

.....

**Tenderers are encouraged to truthfully declare all other company interests they may have, with specific reference to Question 3.14, of which if not fully completed, might lead to disqualification. Tenderers are encouraged to utilise the CIPC bizportal (www.bizportal.gov.za) , free registration to check the companies for which a director is a director for. This can be done by inserting an ID number for the director tendering and the portal will show all companies, whether active or not.*

Employer:		Contractor:	
Witness:		Witness:	



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

Full Name	Identity Number	State Employee Number

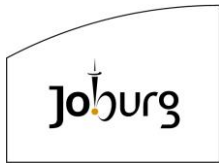
.....
Signature

.....
Date

.....
Capacity

.....
Name of Bidder

Employer:		Contractor:	
Witness:		Witness:	



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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 database 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:		

Employer:		Contractor:	
Witness:		Witness:	



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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

Employer:		Contractor:	
Witness:		Witness:	



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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

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**

- 2.1 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.

- 2.2 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

.....

.....

Employer:		Contractor:	
Witness:		Witness:	



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- 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

.....
.....

Employer:		Contractor:	
Witness:		Witness:	



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CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND
CORRECT.

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

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

Employer:		Contractor:	
Witness:		Witness:	



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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.

Employer:		Contractor:	
Witness:		Witness:	



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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;
 - (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.

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.**

Employer:		Contractor:	
Witness:		Witness:	



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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

Employer:		Contractor:	
Witness:		Witness:	



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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: _____

Employer:		Contractor:	
Witness:		Witness:	



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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: _____

Employer:		Contractor:	
Witness:		Witness:	



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T2.1.7 CONTACTABLE REFERENCE

Criteria 1: Construction of Elevated Reinforced Concrete water retaining structure

To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. No. **JW14402** for **TURFFONTEIN CORRIDORS OF FREEDOM – WATER UPGRADE (FORESTHILL TOWER AND PUMP STATION, JOHANNESBURG SOUTH**

Name of Tenderer:

Name of Project:

Description of Services Provided (Summary of scope)

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

Structure:.....

Material:.....

Size:.....

Infrastructure co-ordinates:.....

.....

Was their performance satisfactory? **Yes / No***

Were the quality / specifications complied with **Yes / No***

If No, please furnish details:

.....

.....

Will you recommend this supplier to anyone without reservations: **Yes / No**

Employer:		Contractor:	
Witness:		Witness:	



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Rate this supplier out of a possible score of 5 (5 being excellent and 1 being unacceptable) ...

Name of authorised person:

Signature: Date:

Telephone/Mobile: Email:

Completed on behalf (Name of Client):

NB: This document must be completed by the referee 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.

Note: Coordinates are required for infrastructure projects to allow Johannesburg Water to verify the existence, location and completion of the projects claimed by the Tenderer. This information will be confirmed as part of the reference check process for the recommended bidder.

Employer:		Contractor:	
Witness:		Witness:	



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T2.1.7 CONTACTABLE REFERENCE

Criteria 2: Tenderers Experience with Respect to Construction of Pump Stations

To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. No. **JW14402** for **TURFFONTEIN CORRIDORS OF FREEDOM – WATER UPGRADE (FORESTHILL TOWER AND PUMP STATION, JOHANNESBURG SOUTH**

Name of Tenderer:

Name of Project:

Description of Services Provided (Summary of scope)

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

Flow rate:.....

Infrastructure co-ordinates:.....

.....

Was their performance satisfactory? **Yes / No***

Were the quality / specifications complied with **Yes / No***

If No, please furnish details:

.....

.....

Will you recommend this supplier to anyone without reservations: **Yes / No**

Employer:		Contractor:	
Witness:		Witness:	



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Rate this supplier out of a possible score of 5 (5 being excellent and 1 being unacceptable) ...

Name of authorised person:

Signature: Date:

Telephone/Mobile: Email:

Completed on behalf (Name of Client):

NB: This document must be completed by the referee 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.

Note: Coordinates are required for infrastructure projects to allow Johannesburg Water to verify the existence, location and completion of the projects claimed by the Tenderer. This information will be confirmed as part of the reference check process for the recommended bidder.

Employer:		Contractor:	
Witness:		Witness:	



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Rate this supplier out of a possible score of 5 (5 being excellent and 1 being unacceptable) ...

Name of authorised person:

Signature: Date:

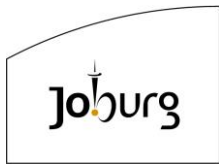
Telephone/Mobile: Email:

Completed on behalf (Name of Client):

NB: This document must be completed by the referee 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.

Note: Coordinates are required for infrastructure projects to allow Johannesburg Water to verify the existence, location and completion of the projects claimed by the Tenderer. This information will be confirmed as part of the reference check process for the recommended bidder.

Employer:		Contractor:	
Witness:		Witness:	



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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 CONTRACTOR'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 Agent						
Mechanical Engineering Foreman						
Civil Engineering Foreman						
Electrical and C&I Engineering Foreman						
Safety Officer						
Others:						

SIGNATURE:

DATE:

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

Employer:		Contractor:	
Witness:		Witness:	



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T2.1.9 CURRICULUM VITAE OF KEY PERSONNEL

ALL CVs MUST BE COMPLETED IN THE TEMPLATE LISTED BELOW. CVs THAT ARE PROVIDED IN ANY OTHER FORMAT WILL NOT BE CONSIDERED.

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

Proposed role in the project	CONTRACTS MANAGER
-------------------------------------	--------------------------

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

6. Education (Submit certified copies of qualifications)

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

7. Registration/Membership of Professional Bodies (Submit copies of registration certificates)

Institution/ Professional Body	Category of Registration	Registration Number

8. Post Qualification Experience

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

Employer:		Contractor:	
Witness:		Witness:	



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9. Project-based Experience

Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Employer:		Contractor:	
Witness:		Witness:	



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Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Duplicate relevant section to add more information, if required.

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

.....
Signature of person named in the schedule

.....
Date

Employer:		Contractor:	
Witness:		Witness:	



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Proposed role in the project	SITE AGENT
-------------------------------------	-------------------

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

6. Education (Submit certified copies of qualifications)

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

7. Registration/Membership of Professional Bodies (Submit copies of registration certificates)

Institution/ Professional Body	Category of Registration	Registration Number

8. Post Qualification Experience

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

Employer:		Contractor:	
Witness:		Witness:	



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9. Project-based Experience

Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Employer:		Contractor:	
Witness:		Witness:	



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Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Project Name and Locality	
Project Client	
Project Dates	
Project Value	
Project position (e.g. Contracts Manager, Site Agent, etc.)	
Description of Duties	
Description of Project Scope	

Duplicate relevant section to add more information, if required.

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

.....
Signature of person named in the schedule

.....
Date

Employer:		Contractor:	
Witness:		Witness:	



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Proposed role in the project	FOREMAN/SUPERVISOR
-------------------------------------	---------------------------

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

6. Education (Submit certified copies of qualifications)

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

7. Registration/Membership of Professional Bodies (Submit copies of registration certificates)

Institution/ Professional Body	Category of Registration	Registration Number

8. Post Qualification Experience

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

Employer:		Contractor:	
Witness:		Witness:	



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UPGRADE (FOREST HILL TOWER AND PUMP STATION),
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Returnable Documents

9. Project-based Experience

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

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

Employer:		Contractor:	
Witness:		Witness:	



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

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

Duplicate relevant section to add more information, if required.

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

.....
Signature of person named in the schedule

.....
Date

Employer:		Contractor:	
Witness:		Witness:	



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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 (Submit certified copies of qualifications)

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

7. Registration/Membership of Professional Bodies (Submit copies of registration certificates)

Institution/ Professional Body	Category of Registration	Registration Number

8. Post Qualification Experience

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

Employer:		Contractor:	
Witness:		Witness:	



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9. Project-based Experience

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

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

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

Employer:		Contractor:	
Witness:		Witness:	



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Returnable Documents

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

Duplicate relevant section to add more information, if required.

Certification:

I, the undersigned, certify that, to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

.....
Signature of person named in the schedule

.....
Date

Employer:		Contractor:	
Witness:		Witness:	



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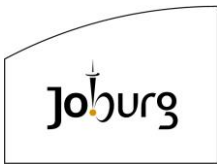


T2.2 LIST OF RETURNABLE DOCUMENTS

Other documents required only for tender evaluation purposes:

<u>Document</u>	<u>Page No.</u>
T2.2.1 Contractor's Certificate of Registration With CIDB	RD.50
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration	RD.51

Employer:		Contractor:	
Witness:		Witness:	



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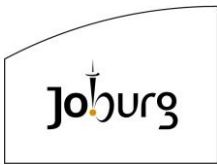
T2.2.1 CONTRACTOR'S CERTIFICATE OF REGISTRATION WITH CIDB

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.

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

DATE:

Employer:		Contractor:	
Witness:		Witness:	



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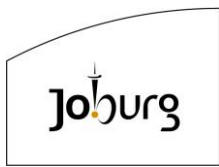
**T2.2.2 SARS TAX COMPLIANCE STATUS PIN AND PROOF OF CSD
REGISTRATION**

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

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

DATE:

Employer:		Contractor:	
Witness:		Witness:	



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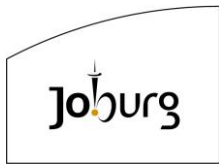


T2.3 LIST OF RETURNABLE SCHEDULES

3. Other documents that will be incorporated into the contract

<u>Document</u>	<u>Page No.</u>
T2.3.1 Returnable Annexure A: Acknowledgement of SHE Specification &	RD.53
T2.3.2 Returnable Annexure B: Acknowledgment of Tender Drawings	RD.54
T2.3.3 Minutes of the Mandatory Tender Briefing	RD.55
T2.3.4 Imported Content Sheet: Forward Exchange Cover for Imported	RD.56

Employer:		Contractor:	
Witness:		Witness:	



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T2.3.1 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:

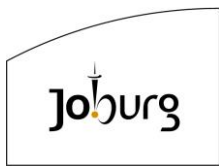
- Comply with all applicable SHE related legal and other requirements.
- Inform all staff of their role in managing environmental impacts and safety hazards on site.

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

Name of tenderer	
Name of Authorized person	
Authorized Signature*	

*Signature must be as per form T2.1.2 as applicable

Employer:		Contractor:	
Witness:		Witness:	



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T2.3.2 RETURNABLE ANNEXURE B: ACKNOWLEDGMENT 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:

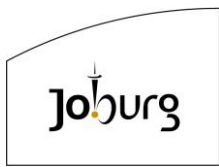
The drawings that are issued for **TENDER PURPOSES** are as per drawing list BW1400-RHD-C1-99-D-Z-9902

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

Name of tenderer	
Name of Authorized person	
Authorized Signature*	

*Signature must be as per form T2.1.2 as applicable

Employer:		Contractor:	
Witness:		Witness:	



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T2.3.3 MINUTES OF THE MANDATORY TENDER BRIEFING MEETING

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.		Minutes of the Mandatory Tender Briefing Meeting

Attach additional pages if more space is required.

Signed: Date:

Name: Position:

Tenderer:

Employer:		Contractor:	
Witness:		Witness:	



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T2.3.4 IMPORTED CONTENT SHEET: FORWARD EXCHANGE COVER FOR IMPORTED GOODS

The Tenderer shall, in the attached schedule, for each item which a price is tendered, state the item number as it appears in the Schedule of Quantities, a brief description of the item, the country of origin, the value of the imported content of all goods comprising that item, the number of items for which he requires forward exchange cover, and the total amount for which forward exchange cover will be required.

Each Part of the Schedule of Quantities must be dealt with separately.

In the event of components being imported from more than one country, a separate entry shall be made for each country.

The Tenderer shall state the applicable rate(s) for the relevant country(ies) as at the date seven days prior to the closing date for the receipt of tenders.

Exchange rate(s) as at(insert date)

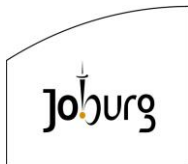
Country	Exchange Rate

SIGNED ON BEHALF OF TENDERER :

NAME (in print) :

DATE :

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
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Volume 1 Tender and Contract

Section C1 Agreement and Contract Data

Johannesburg Water (SOC) Ltd



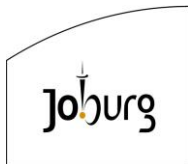
CONTRACT: JW14402

TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP
STATION), JOHANNESBURG SOUTH

VOLUME 1

PART 1: AGREEMENT AND CONTRACT DATA

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
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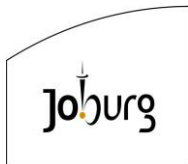
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Section C1 Agreement and Contract Data

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 C1.3 FORMS AND SECURITIES	 C.29
Error! Reference source not found.	C.Error! Bookmark not defined.
C1.3.2 Blasting Indemnity	C.33
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	C.35
C1.3.4 Health and Safety Contract: General Information	C.36

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
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Section C1 Agreement and Contract Data

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:

JW14402: TURFFONTEIN CORRIDORS OF FREEDOM – WATER UPGRADE (FOREST HILL TOWER AND PUMP STATION), JOHANNESBURG SOUTH

The Tenderer, identified in the Offer signature block below, has examined the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the Tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance, the 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, 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)

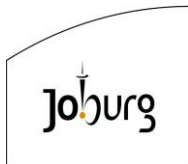
**Name and signature of
witness**

(Name)

(Signature)

Date

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
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Section C1 Agreement and Contract Data

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:

- 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, pricing schedules (Bill of Quantities) 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 Contract Data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data at, or just after, the date 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 a binding contract between the parties.

FOR EMPLOYER OFFICIAL USE ONLY

Name(s)

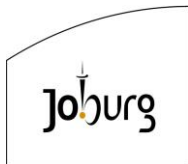
Capacity

For the Employer

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

(Name and address of organisation)

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
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Section C1 Agreement and Contract Data

**Name and signature of
witness**

(Name)

(Signature)

Date

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

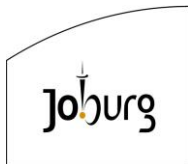
6 Subject

Details

7 Subject

Details

Employer:		Contractor:	
Witness:		Witness:	



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Section C1 Agreement and Contract Data

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 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)

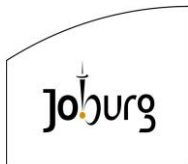
**Name and signature
of witness**

(Name)

(Signature)

Date

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
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Section C1 Agreement and Contract Data

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.

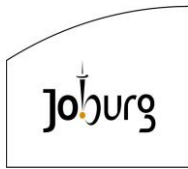
Copies of these conditions of contract may be obtained from the South African Institution of Civil Engineering (Telephone number: 011-805 5947)

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 the Certificate of Completion.
1.1.1.14	Delete clause 1.1.1.14 and replace with: “Due Completion Date” means the date of expiry of the time stated in the Contract Data for achieving Practical Completion of the Works, calculated from the date on which the Employer’s Agent instructs the commencement of Works and adjusted by such extensions of time or acceleration as may be allowed in terms of the Contract.” The time for achieving Practical Completion is 24 months, inclusive of non working and special non-working days.
1. 1.1.15	The name of the Employer is Johannesburg Water (SOC) Limited Contact person is Lebea Rakobo (Project Manager)
1.1.1.16	The name of the Employer’s Agent is TRI-M Consulting Engineers
1.1.1.26	The Pricing Strategy is a Re-measurement Contract.
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 1524 Fax: 011 688 1521 Email: lebea.rakobo@jwater.co.za
1.2.1.2	The address of the Employer’s Agent is TBA after Contract Award
3.2.3	Specific Approval – The Employer’s Agent is required to obtain the Employer’s approval for the following: • Approval of Variation Orders • The use of contingencies • Approval of Prov. Sum (3 Quotes system) • Approval to exceed the Contract Sum

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
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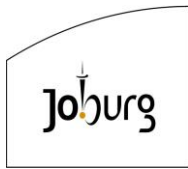


Volume 1 Tender and Contract

Section C1 Agreement and Contract Data

GCC Clause	Information
	• Approval of Subcontracting Plan and work package breakdown • Stoppage/ suspension of works
4.4.2	Add the following after this clause: Apart from sub-contractors 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. 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 30% of the Contract Price shall be subcontracted to SMME's. Where the advised items for subcontracting do not form 30% of the Contract Price, the Contractor shall identify additional works that will be subcontracted to ensure compliance with the minimum subcontracting percentage.
4.10.1	Add the following to this clause: 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.
4.11.1	Add the following to this clause: Competent Employees shall include, amongst others, the following Key Personnel: • Contracts Manager • Site Agent • Safety Officer • Civil, Mechanical, Electrical and C&I Engineering Senior Foremen The minimum requirements in terms of qualifications and experience of these Key Personnel are listed in C1.2.1.2.15 (see below).

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
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UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH

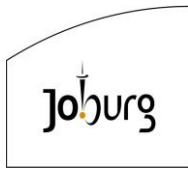


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GCC Clause	Information
5.3.1	The documentation required before commencement with Works execution are: • Approved Health and Safety File (Clause 4.3) • Approval of the Environmental File (Clause 4.3) • Initial programme & cashflow projections (Clause 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 • Delegation of Authority (on company letterhead) • 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 the documentation required before Commencement of the Works is 28 days.
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.
5.4.2	The Works will be executed on an operational Wastewater Treatment Works. The Treatment Works shall remain operational at all times, except when written permission is granted by the Employer's Agent for any interruption or shutdown. All such interruptions/shutdowns shall be included in the Contractor's Programme.
5.8.1	Working days shall be Monday to Friday, between 07h00 to 17h00.
5.8.1	The non-working days are Saturdays and Sundays. 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	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.

Employer:		Contractor:	
Witness:		Witness:	



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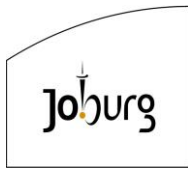


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GCC Clause	Information
5.13.1	The penalty for failing to complete the Works is the greater of: An amount equal to the daily Time Related P&G rate (as calculated from the Time Related P&G section in the Bill of Quantities) or R25,000.00 per day, whichever is greater.
5.14.1	The requirements for achieving Practical Completion are: • Construction, testing & commissioning of the new 2,5ML Forest Hill Tower and Pump station. • 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 chambers (including all pipework, valves, civil and electrical infrastructure). Construction, Installation, testing & commissioning of all security infrastructure (including fencing, gates, CCTV systems etc).
5.16.3	The latent defects period is 10 years for Civil Engineering works, Five (5) years for Building Works, Three (3) years for Electrical, Control and Instrumentation engineering works and Five (5) years for Mechanical engineering works.
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 a On-demand Performance Guarantee and will comply with the requirements of Clause 6.2.3. 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 for this contract. The following formula will be applicable. $(1 - x) \left[a \frac{L_t}{L_o} + b \frac{P_t}{P_o} + c \frac{C_t}{C_o} + d \frac{M_t}{M_o} + e \frac{E_t}{E_o} + f \frac{F_t}{F_o} - 1 \right]$ In which the symbols have the following meaning as per GCC 2015: "x" is the proportion of "Ac" which is not subject to adjustment. The value of "x" is 0,10 "a", "b", "c", "d", "e" and "f" 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. The values of the coefficients are:

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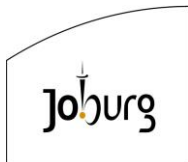


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GCC Clause	Information
	a = 0,30 Labour b = 0,10 Plant c = 0,20 Civil Engineering material d = 0,15 Mechanical Engineering material e = 0,15 Electrical Engineering material f = 0,10 Fuel All indexes below are as published by Statistics South Africa for the applicable time. "L" is the "Labour Index" - Table 9 – Consumer price indices for Gauteng - All items "P" is the "Plant Index" - P0141. Table 4 – Mining and construction plant and equipment – Plant and equipment "C" is the "Civil Engineering Materials Index" - P0141. Table 6 – Civil engineering material – Total "M" is the "Mechanical Engineering Materials Index" - P0141. Table 5 – Mechanical and electrical engineering – Mechanical engineering "E" is the "Electrical Engineering Materials Index" - P0141. Table 5 – Mechanical and electrical engineering – Electrical engineering "F" is the "Fuel Index"- P0142.1. Table 1 – PPI for final manufactured goods. Diesel 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. The province where the Site is located is Gauteng and the urban area where the project is implemented is Johannesburg. The base month is one month before the tender closing date. 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 contractor is to provide latest available published indices prior to claiming final adjustment for any month, with supporting documentation.
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%.

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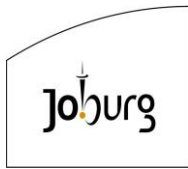


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GCC Clause	Information
6.10.3	The percentage retention on the amounts due to the Contractor is 10%. The limit of retention money is 5% of the Contract Price.
6.10.4	Delivery, dissatisfaction with and payment of payment certificates Delete Clause 6.10.4 and replace with the following: Payment shall be made upon: • 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 60 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.
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: In the first line, correct the spelling of 'therefore'.
8.1.1	Add to the end of Clause 8.1.1 the following text: "Although the extent of the Works and the Site are located within the boundaries of the Forest Hills Tower and Pumpstation Site, and the Employer may (or may not) provide security for the Tower Site as a whole, the Contractor shall remain solely responsible for the protection of the Works and the Site".
8.4.1.1	Add to the end of Clause 8.4.1.1 the following text: "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	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

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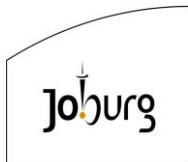


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GCC Clause	Information
	have the right to make all and any enquiries either on the Site or elsewhere as to the cause and results of any such accident and the Contractor shall give the Employer's Agent full access and facilities for carrying out such 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."
8.6.1.1.2	The value of plant and materials supplied by the Employer to be included in the insurance sum is R 0.00.
8.6.1.1.3	The amount to cover professional fees for repairing damage and loss to be included in the insurance sum 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, will be provided 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 for Construction Works 2015 Clauses 8.6.1.1 to 8.6.1.4 the following insurance is also required: - 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 affected with an Insurer and in terms approved by the Employer (which approval shall not be unreasonably withheld) and the Contractor shall, when 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. - The Contractor and the Sub-contractors shall affect 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)

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Witness:		Witness:	



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	c. The Contractor and the Sub-Contractors shall affect 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.
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.

C1.2.1.2 Additions

The additional Conditions of Contract are:

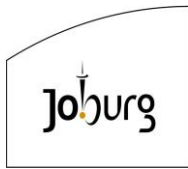
C1.2.1.2.1 Penalties

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, 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 occasion; 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.

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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 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
- 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.

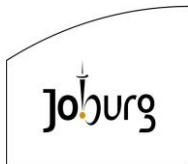
c) Failure to meet target participation by local SMME

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**, the Contractor shall be liable to the Employer for a sum calculated in accordance with the Contract Data and the aforementioned Scope 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 the 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 occupational health and safety compliance target

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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 (e.g. behavioral based safety inspection) assessments and other requirements, as necessary.

The Employer will impose a penalty value of R20 000,00 per audit report where a Contractor scores below 85%.

The Employer will impose a penalty value of R2 000,00 per occasion where the Contractor scores above 85% but below 93% for two successive months.

e) Failure to meet the Environmental 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.

The Employer will impose a penalty value of R20 000,00 per audit report where a Contractor scores below 85%.

The Employer will impose a penalty value of R2 000,00 per occasion where the Contractor scores above 85% but below 93% for two successive months.

f) Penalties payable

If penalties are payable, they will be processed through a credit note issued by the Contractor.

g) Penalties irreversible

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

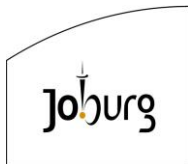
C1.2.1.2.2 Source of Instructions

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.

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Witness:		Witness:	



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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.

C1.2.1.2.6 Returns of Labour, SMME, Plant, Equipment and Material

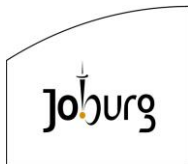
The Contractor shall provide a return in detail in the form and at such intervals as the Employer's Agent or his duly authorized representative may prescribe showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting construction plant, equipment and material as the Employer's Agent or his duly authorized representative may require. 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

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- Monthly Individual proof of payment
- Monthly 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.

- 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

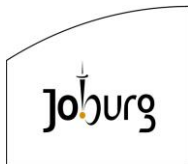
No work shall be covered up or put out of view without the approval of the Employer's Agent or his duly authorized representative and the Contractor shall afford full opportunity for the Employer's Agent or his duly authorized representative to examine and measure any work which is about to be covered 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

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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.

C1.2.1.2.12 Ambiguities and Inconsistencies

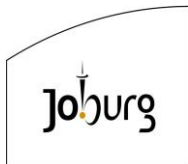
The Employer or the Contractor shall notify the other as soon as either becomes aware of an ambiguity or inconsistency in or between the documents, which are part of this Contract. Governed by the spirit and intention of the Contract, the Employer shall give a binding instruction resolving the ambiguity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

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Witness:		Witness:	



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UPGRADE (FOREST HILL TOWER AND PUMP STATION),

JOHANNESBURG SOUTH



Volume 1 Tender and Contract

Section C1 Agreement and Contract Data

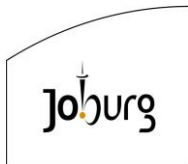
C1.2.1.2.14 Special Conditions

The successful Contractor must subcontract a minimum of 3% 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 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 will identify subcontracting items or tasks that will meet the subcontracting minimum of 3% of the value of this Contract. In complying with this condition, the following shall be adhered with:
 - The Contractor shall develop a Subcontracting Plan that sets out the details of the 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 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.
 - The Employers Agent may assist with identified items for subcontracting but where these do not form 3% of the Contract Price, the Contractor shall identify additional works that will be subcontracted to ensure compliance with the minimum subcontracting percentage.

Employer:		Contractor:	
Witness:		Witness:	



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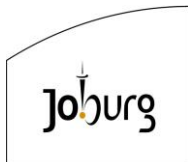


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- In the event that a rate supplied by the Contractor for a specific BoQ work item is not sufficient to cover Subcontractor costs/rates for that specific item, the Contractor shall provide a detailed rate breakdown for that specific BoQ item (and each 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 3% 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 have full discretion as to when the penalty will be applied (i.e. the month in which the penalty amount will be deducted). 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 3% 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 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.
 - Indicate the remuneration rate of all local labourers (the latest Gazetted labour rates)

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Witness:		Witness:	



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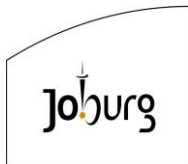


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- A Skills Transfer Plan which will indicate, amongst others, the proposed skills that will be transferred to the Subcontractor, individuals that will be identified for skills transfer, the amount that will be spent by the Contractor on skills transfer, 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/provisos: 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.
 - 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 periodic 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 domicile 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

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Witness:		Witness:	



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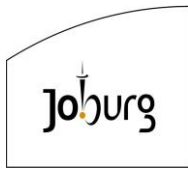
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- Scope of work issued to the Subcontractor
 - Value of the work issued (this information must be submitted in a format that is readily auditable)
 - Monthly payments made to the subcontractor (this information must be submitted in a format that is 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.
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.

C1.2.1.2.15 Competent Employees

Competent Employees	Qualifications	Experience
Contracts Manager	Minimum Qualifications 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 / AND Professional Registration (Pr. Eng. / Pr. Technologist, PrCPM) will obtain a score for experience of a Contract Manager. However, the date of registration of Contract Manager will not impact post qualification number of projects	Number of Projects Involving construction of Water Retaining Structures (Elevated Reinforced Concrete Tower) Or Construction of Reinforced Concrete Reservoirs And Construction Of Pump Station and Bulk Steel Pipe Work Completed) Note: A single project that includes the construction of a water retaining structure, together with the construction of a pump station and bulk steel pipework will be regarded as one project for evaluation purposes.
Site Manager	Minimum Qualifications of Site Manager Only Site Managers with qualifications of National Diploma (Civil/ Structural) Engineering or higher AND Registered as a Candidate Engineering Professional with the ECSA or better will be considered	Number of Projects Involving construction of Water Retaining Structures (Elevated Reinforced Concrete Tower or Reservoirs). And

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		Construction of Pump Station and Bulk Steel Pipe Work Completed as Site Agent / Site Manager) Note: Combination of the above will be counted as one
Foremen/Supervisor	Foreman/ Supervisor with qualifications of National Diploma (Electrical/Mechanical) Engineering or more and Registered as a Candidate Professional in the Built Environment or more will be considered.	Construction of Pump Station and As Foreman / Supervisor / Resident Engineer/ Site Engineer)
Safety Officer	Post Qualification Experience of Safety Officer Only Safety Officers with qualifications of National Diploma (Safety Management/ Environmental Health/Environmental Science/ Environmental Management), Safety Officers Course (NQF 6) or more. AND Registered with SACPCMP in the "Construction Health and Safety" Sector will be considered. SAMTRAC / SHEOMTRAC/ SHEMTRAC / MESHTRAC /NEBOSH / However, the time of registration of Safety Officer will not impact post qualification number of projects	Number Of Civil/Structural Engineering Projects Completed as Safety Officer

C1.2.1.2.16 Tie-in Limitations

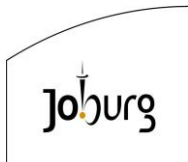
The connection of new infrastructure to the existing infrastructure is limited to low-flow periods and subject to prior arrangement and approval by the Client.

C1.2.1.3 Variations to General Conditions of Contract

Add the following Table:

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
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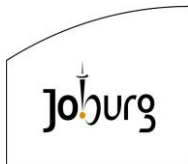


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	and Safety Agents Registered In Terms Of Section 18(1)(c) of the Project And Construction Management Professions Act (Act No. 48 Of 2000)", including Clauses 2.2.5 "STAGE 5 - CONSTRUCTION DOCUMENTATION AND MANAGEMENT", and 2.2.6 "STAGE 6 - PROJECT 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"

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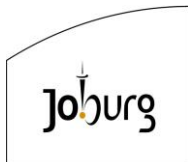
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C1.2.2 Part 2: Data Provided by the Contractor

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: <table border="1"> <thead> <tr> <th align="left">Physical Address:</th> <th align="left">Postal Address:</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr> <td>Tel:</td> <td>Fax:</td> </tr> <tr><td> </td><td> </td></tr> <tr> <td>Email</td> <td> </td> </tr> </tbody> </table>	Physical Address:	Postal Address:									Tel:	Fax:			Email	
Physical Address:	Postal Address:																
Tel:	Fax:																
Email																	
Clause 6.2.1	The security to be provided by the Contractor shall be one of the following: The Performance Guarantee shall be irrevocable, On-Demand Performance Guarantee, to be issued exactly in the form of the proforma document provided in favour of the Employer by a Bank or Recognised Financial Institution or Cash in lieu of bond will apply.																
Clause 6.8.3	The variation in cost of special materials is <table> <thead> <tr> <th align="left">Type</th> <th align="left">Unit</th> <th align="left">Rate</th> </tr> </thead> <tbody> <tr> <td align="center" colspan="3">NOT APPLICABLE</td> </tr> </tbody> </table>	Type	Unit	Rate	NOT APPLICABLE												
Type	Unit	Rate															
NOT APPLICABLE																	

Employer:		Contractor:	
Witness:		Witness:	



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Johannesburg Water (SOC) Ltd



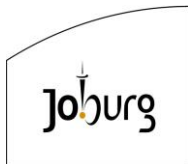
CONTRACT NO: JW14402

**TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP
STATION), JOHANNESBURG SOUTH**

VOLUME 1

PART 1.3: FORMS AND SECURITIES

Employer:		Contractor:	
Witness:		Witness:	



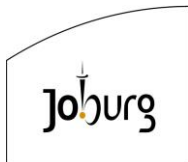
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C1.3.4 Health and Safety Contract: General Information	C.36

Employer:		Contractor:	
Witness:		Witness:	



C1.3 FORMS AND SECURITIES

FORMS FOR COMPLETION BY THE CONTRACTOR

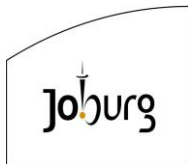
**THE FOLLOWING FORMS ARE TO BE COMPLETED BY THE CONTRACTOR AFTER
THE TENDER HAS BEEN AWARDED TO THE SUCCESSFUL TENDERER**

- 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:	



TO BE PRINTED ON THE OFFICIAL LETTERHEAD OF THE GUARANTOR.
PERFORMANCE GUARANTEE

For use with the General Conditions of Contract for Construction Works, Edition,

GUARANTEE REFERENCE NUMBER: [*]**

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”).

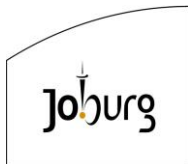
And whereas the Contract requires the Contractor to provide to the Employer an on-demand performance guarantee for the due and proper performance by the Contractor of its obligations in terms of the Contract.

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:

1. To pay the Employer the sum or sums not exceeding the following aggregate amount: R [insert the amount] (the “Guaranteed Amount”) upon receipt of the documents identified in clauses 1.1 to 1.3 below
 - 1.1. A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Engineer in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 1.2;
 - 1.2. A first written demand issued by the Employer to the Guarantor e-mailed towith a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 1.1 above and the sum certified has still not been paid;
 - 1.3. A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum.
2. To pay to the Employer the Guaranteed Amount or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor emailed

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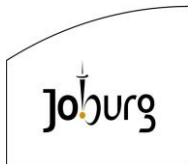


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to calling up this Performance Guarantee, such demand stating that:

- 2.1. The Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 2; or
 - 2.2. A provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 2; and
 - 2.3. The aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.
3. To pay to the Employer on demand any sum or sums not exceeding 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.
 4. Payment by the Guarantor in terms of 1 to 3 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
 5. The Guarantor hereby acknowledges that:
 - 5.1. Any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;
 - 5.2. Its obligation under this Performance Guarantee is restricted to the payment of money.
 6. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
 7. 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.

Employer:		Contractor:	
Witness:		Witness:	



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8. This Performance Guarantee, with the required demand notices in terms of 1 to 3, shall be regarded as a liquid document for the purpose of obtaining a court order.
9. This Performance Guarantee is neither negotiable nor transferable.
10. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the date on which the Certificate of Completion of the Works has been issued or payment in full of the Guaranteed Sum, whichever occurs first. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.
11. The Guarantor chooses the physical address **[insert the full physical address]** care of **[insert the full names]**, as well as the e-mail address, for the service of all notices for all purposes in connection herewith.
12. This Guarantor 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).

Signed at for and on behalf of

Guarantor's signatory (1)

Name:

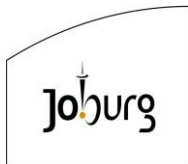
Designation:

Guarantor's signatory (2)

Name:

Designation:

Employer:		Contractor:	
Witness:		Witness:	



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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.

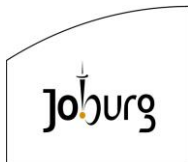
WHEREAS the Contractor has entered into a Contract with the Johannesburg Water (SOC) Ltd (hereinafter called the Employer) for,

_____ 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.

THUS, DONE AND SIGNED for and on behalf of the Contractor at _____ on the _____ day of _____ 20_____ in the presence of the subscribing witnesses.

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH



Volume 1 Tender and Contract
Section C1 Forms and Securities

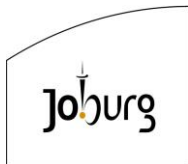
As witnesses:

1. _____
Name & Surname _____ Signature _____
2. _____
Name & Surname _____ Signature _____

Duly authorised to sign on behalf of: _____

Address: _____

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
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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 _____

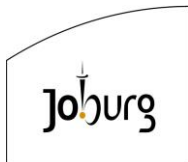
Signature on behalf of mandatory _____

Signature on behalf of Employer _____

Compensation Fund Registration No. of mandatory _____

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

Employer:		Contractor:	
Witness:		Witness:	



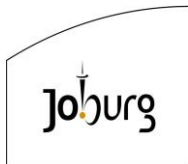
Contract: JW14402
**TURFFONTEIN CORRIDORS OF FREEDOM – WATER
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C1.3.4 Health and Safety Contract: General Information

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 **JW14402: TURFFONTEIN CORRIDORS OF FREEDOM – WATER - UPGRADE (FOREST HILL TOWER AND PUMP STATION), JOHANNESBURG SOUTH**
11. The area in which the work is to be conducted is Forest Hill (Rifle Range Rd)
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:	



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C1.3.4.1 Occupational Health and Safety Indemnity Undertaking

I, the undersigned _____

in my capacity as _____

of the firm _____

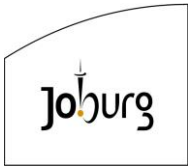
1. Hereby undertake to ensure that I/my firm and/or employees and/or subcontractors and/or his employees -
 - 1.1 comply strictly with the provisions of the Occupational Health and Safety Act of 1993 (as amended) and/or the regulations promulgated in terms thereof, with specific reference to section 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. I hereby confirm that I have the authority to sign this indemnity undertaking and that the Employer is not obliged to confirm such confirmation.

Signed at _____ This _____ day of _____

Signature

Capacity

Employer:		Contractor:	
Witness:		Witness:	



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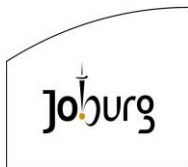


As witnesses:

1

2

Employer:		Contractor:	
Witness:		Witness:	



Johannesburg Water SOC Ltd



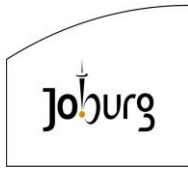
CONTRACT NO: JW14402

**TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP
STATION), JOHANNESBURG SOUTH**

VOLUME 1

PART 2: PRICING DATA

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
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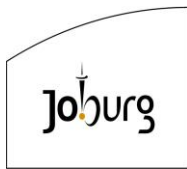
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Section C2 Pricing Data

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	Page No.
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C2.1.3 Special payment conditions	PD.6
C2.1.3.1 Applicability of payment items	PD.6
C2.1.3.3 Working outside normal hours	PD.6
C2.1.4 SMME Portion of the Works	PD.6
BILL OF QUANTITIES	PD.8

Employer:		Contractor:	
Witness:		Witness:	



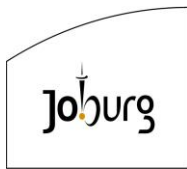
C2 PRICING DATA

C2.1 Pricing Instructions

C2.1.1 General preamble to the bill of quantities (Engineering works)

- a) 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.
- b) 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 Specifications. Variations and amendments to the Project Standard Specifications are contained in the Scope of Work, Portion 2: Variations and/or Additions to the Project Standard Specifications.
- c) 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.
- d) 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.
- e) Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.
- f) 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 Employer’s Agent 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. The Contractor must not order the quantities of materials stated in the Bill of Quantities until he has confirmed from the Construction Drawings or measurement on Site that such quantities are in fact the correct quantities.
- g) 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

Employer:		Contractor:	
Witness:		Witness:	



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Section C2 Pricing Data

these shall be used as a basis for assessment of payment for additional work that may have to be carried out.

h) A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered will be considered to be covered by the other prices or rates in the Schedule.

i) The units of measurement described in the Bill of Quantities are metric units. Alternatives used are as follows:

mm	=	millimetre	=	hour
m	=	metre	kg	= kilogram
km	=	kilometre	t	= ton (1000kg)
m2	=	square metre	No.	= number
m2 pass	=	square metre pass	sum	= lump sum
ha	=	hectare	MN	= mega-newton
m3	=	cubic metre	MN.m	= mega-newton-metre
m3km	=	cubic metre-kilometre	PC sum	= Prime Cost sum
l	=	litre	Prov sum	= Provisional sum
kl	=	kilolitre	%	= percent
MPa	=	megapascal	kW	= kilowatt
W/day	=	Workday	R/only	= Rate only

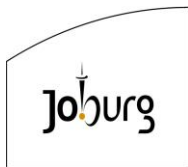
j) For the purpose of this Bill of Quantities, where applicable, the following words shall have the meanings hereby assigned to them:

Unit	:	The unit of measurement for each item of work as defined in the SANS 1200.
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.

k) 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.

l) While the Employer has every intent to complete the full scope of works, the Employer reserves the right to reduce or increase the scope of works according to the budget, or to terminate this contract, with adjustment to the agreed rates, sums or fees and without payment of any penalty in this regard. The Service Provider shall however be entitled to pro-rata payment for all services carried out in terms of any adjustment to the Scope of Work or, in the case of termination, remuneration and/or reimbursement.

Employer:		Contractor:	
Witness:		Witness:	



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JOHANNESBURG SOUTH

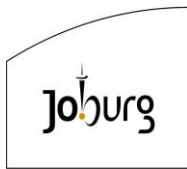


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Section C2 Pricing Data

- m) The Bill of Quantities shall be completed by hand in INK or TYPED. The Bill of Quantities in the tender document may be replaced with the typed electronic Bill of Quantities, without changing the quantities, items and description.

Employer:		Contractor:	
Witness:		Witness:	



C2.1.2 Sufficiency of tender

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the construction of the Works and of the rates and prices, which rates and prices shall, except in so far as it is otherwise provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution and completion of the Works.

C2.1.3 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.

C2.1.3.1 Applicability of payment items

All payment items forming part of this Contract shall not apply to ordered Works completed by the Contractor under this Contract, where completed Works:

- are not completed to acceptable quality;
- are not issued by the Employer's Agent;
- are still within the defects and liability period; or
- are not accepted by the Employer's Agent or his duly authorised representative.

C2.1.3.3 Working outside normal hours

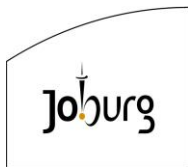
The additional costs, if any, to perform works outside normal working hours shall be deemed to have been allowed for in the provided activity pricing rates and/or prices.

C2.1.4 SMME Portion of the Works

A portion of the works must be allocated for completion by appointed SMMEs.

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, Johannesburg Water will supply the Main Contractor with a list of SMMEs which the Main Contractor can approach to provide rates for the items envisaged for subcontracting. 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.

Employer:		Contractor:	
Witness:		Witness:	



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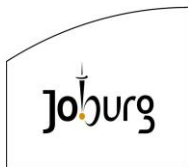
Section C2 Pricing Data

Further an allowance has been made for the Contractor to complete the following tasks:

- The Contractor shall ensure that the Sub-Contractor(s) complies with paying all amounts due in respect of his employees and himself in terms of all relevant legislation and regulations including, but not confined to, the
 - Income Tax Act, the
 - Compensation for Occupational Injuries and Diseases Act,
 - Unemployment Insurance Act,
 - Basic Conditions of Employment Act
- Monitoring of the Quality of Work completed by the Sub-contractor/SMME
- Skills transfer during the execution of the project
- Compliance with all aspects of the Scope of Work
- Assistance with sourcing of applicable material in line with the technical data sheets

Further an allowance has been made for “Training” – this is related to CETA accredited training which is to be agreed with the Employer during project execution. No amount can be claimed under this item for on-site or on-the-job training, only for accredited training which the SMME receives.

Employer:		Contractor:	
Witness:		Witness:	



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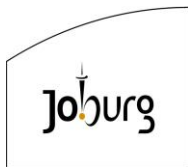


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Section C2 Pricing Data

BILL OF QUANTITIES

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH



Volume 1 Tender and Contract

Section C2 Pricing Data

Summary of the Schedule of Quantities		
	Description	Total:
Schedule 1	Preliminary and general	
Schedule 2	Occupational health and safety requirements	
Schedule 3	2,5 Ml capacity elevated water tower	
Schedule 4	Pump station and guard hut	
Schedule 5	Security fencing	
Schedule 6	Chambers	
Schedule 7	Pipe work	
Schedule 8	Special equipment	
Schedule 9	Road works, kerbing & storm water	
Schedule10	Alterations and refurbishment of existing buildings	
Schedule 11	Site Works	
Schedule 12	electrical & Emergency Generator installation (see electrical bill)	
Sub - total A		
Add - 15% Escalation (Compulsory)		
Sub - total B		
Add - 15% Contingencies (Compulsory)		
Sub - total C		
Add 15% Value Added Tax		
Tender Sum carried to form of offer :		

Employer:		Contractor:	
Witness:		Witness:	

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER

REV 8

TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

BILL OF QUANTITIES



BILL OF QUANTITIES PAGE NUMBER 8

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS	1200	Schedule 1				
		Preliminary and general				
1.1		Fixed charge items				
1.1.1	A8.3.1	<u>Contractual requirements:</u> All Contractual requirements affecting the Contractor: The sum shall cover the Contractor's initial cost of providing surities, insurances as per the GCC and the Contract Data and any other financial obligations of a preliminary and general nature.	sum			
1.1.2		<u>Establishment of Facilities in the site:</u>				
1.1.2.1	A8.3.2	<u>Facilities for the Contractor:</u> Offices & storage facilities, workshops, ablutions, tools and equipment, plant, cranes, water and electricity and any other facilities required by the Contractor for the succesful completion of the project. Deal with rain and/or ground water in all type of excavations on site as described in SANS 1 200 A section 5.5	sum			
1.1.2.2		<u>Facilities for the Client's agent</u> Client's Agent facilities as described in PSAB 3.2 Engineer's Office in the Project Specifications:	sum			
	PSAB 3.1	Name board (2 number) as specified in the Tender Document				
	PSA8.3.2.1	Furnished office for the Project Manager's USE (see item PSAB3.2 in the document) including carport and board room for site meetings as well as equipment as described in PSAB 4				
	PSA8.3.2.1	Furnished office for the Client's use (see item PSAB3.2 in the document)				
1.1.3	A8.3.4	<u>Removal of site establishment</u> Removal of all items established in terms of 1.1.2.1 above and shall provide for the restoring the Site to it's original state	sum			
1.2		Time related items				
1.2.1	A8.4.1	Contractual requirements on a monthly bases affecting the Contractor	month	24		
		The Contractor to maintain the following items or as amended in the Tender Document - for the duration of the Contract :				
1.2.2	A8.4.2.2	All facilities on the site for the Engineer & for the Contractor	month	24		
		Other obligations by the Contractor on a time bases for the duration of the Contract :				
1.2.3	A8.4.3	Full time supervision of the site as specified in the Tender Document	month	24		
1.2.4	A8.4.4	Company & head office administration costs pertaining to the Contract	month	24		
1.2.5	A8.4.5	Other time related obligations by the Contractor	month	24		
1.2.6	PS2.13	Accomodation of traffic	month	24		
1.2.7		Provide security for the duration of the project	month	24		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 10						
BILL OF QUANTITIES PAGE NUMBER 9						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/08/2025

JOBURG WATER

TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule 1 continued				
1200		Preliminary and general				
- \SCHEDULE CONTINUED FROM PAGE 9						
1.3 Provisional sums by the Engineer						
1.3.1	A8.5a	Provisional sum for various tests requested by the Engineer	Prov	1	140,000.00	140,000.00
1.3.2	PSA5.10.2	Prov sum for SC and CLO payments	Prov	1	240,000.00	240,000.00
1.3.3	PSA5.10.2	Prov sum for JW trainee payments	Prov	1	288,000.00	288,000.00
1.3.4	PSA5.10.3	Accredited skills training (concrete works)	Prov	1	70,000.00	70,000.00
1.3.5	PSA5.10.3	Accredited construction management training	Prov	1	50,000.00	50,000.00
1.3.9		Provisional sums for Electrical supply (City Power)	Prov	1	700,000.00	700,000.00
		Mark-up and Handling fee on otems 1.3.1 to 13.5 above		%		
SCHEDULE 1 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 10						

ContractorWitness 1Witness 2EmployerWitness 1Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities tender	Rate	Amount Rands.cents
SANS		Schedule 2				
1 200		Occupational health and safety requirements				
2.1		Notification of construction work				
2.1.1		Quantities are re-measurable- proof shall be supplied by the contractor of quantities claimed Notification of Construction work to the Provincial Director as requested by the Engineer under the Construction Regulations of the Occupational Health & Safety (Regulation 3) Act no. 85/1993	sum	1		
2.2		Health and safety plan				
2.2.1		Based on the Occupational Health and Safety specification, setting up a job and site specific Health and Safety Plan under the Construction Regulations (Regulation 5) of the Occupational Health & Safety Act no. 85/1993	sum	1		
2.3		Health and safety main file				
2.3.1		Setting up a job and site specific Health & Safety Main file as speicied under the Construction Regulations (Regulation 5) of the Occupational Health & Safety Act no. 85/1993 NOT TO BE REMOVED FROM SITE File to be a lever arch file with original colour document of acceptable standards including dividers. Emergency telephone numbers to be displayed on back of file. The file will be expanded during the project as and when required by the Client File to include the following: Copy of H&S Act Proof of registration with COLD Insurer Notification of construction work Mandatory Agreement H&S Specifications provided by client Copy of tender document, drawings etc Company Safety Policy to be signed by CEO Company organogramme with respect to H&S on specific site Letters of appointment for specific site List of subcontractors Evacuation plan Risk assessments and method statements Safe work procedures and material safety data sheets Fall protection plan Incident recordings Medical records Minutes of H&S meetings	sum	1		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 12						
BILL OF QUANTITIES PAGE NUMBER 1 1						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS	1 200	Schedule 2 continued Occupational health and safety requirements				
- \ SCHEDULE CONTINUED FROM PAGE 1 1						
2.4 Health & safety register file						
2.4.1		Setting up a job and site specific Health & Safety Register File as requested by the Engineer under the Construction Regulations (Regulation 5) of the Occupational Health & Safety Act no. 85/1993 File to be a lever arch file with original colour document of acceptable standards including dividers. NOT TO BE REMOVED FROM SITE	sum	1		
2.5 Health & Safety training file						
2.5.1		Setting up a job and site specific Health & Safety Training File as requested by the Engineer under the Construction Regulations (Regulation 5) of the Occupational Health & Safety Act no. 85/1993 File to be a lever arch file with original colour document of acceptable standards including dividers. NOT TO BE REMOVED FROM SITE	sum	1		
2.6 Service Provider appointments						
2.6.1		Appointment of a competent person to perform risk assessment and training on site under Construction Regulations (Regulation 7) of the Occupational Health & Safety Act no. 85/1993	sum	1		
2.7 Training on site						
2.7.1		Allow for monthly salary for the H&S representative as required by law for the duration of the project for training The H&S Representative to perform the following : H&S duties on site Appointee to be permanently on site and under supervision of Contractor's Site Supervisor. Appointment to be for the duration of the Contract. Induction training of all workers of Sub-Contractors. Public awareness training. Toolbox talks on environmental awareness First aid awareness Fire fighting awareness Tool box talks on hand tools and hand tool accidents Hold tool box talks on machine guarding Tool box talks on lifting materials by hand Tool box talks on safe loading Tool box talks on safety signs Tool box talks on ten commandments of safety Community training Tool box talks on working on heights Tool box talks on working with safety harness Tool box talks on working with hydraulic elevators	sum	1		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 13						
BILL OF QUANTITIES PAGE NUMBER 12						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands,cents
SANS 1 200	Schedule 2 continued Occupational health and safety requirements					
- \SCHEDULE CONTINUED FROM PAGE 1 2						
2.8 First aid equipment						
2.8.1		First aid box	no	3		
2.8.2		First aid boxes for Sub contractors	no	2		
2.8.3		Stretcher	no	1		
2.9 Fire fighting equipment						
2.9.1		Fire extinguishers	no	3		
2.9.2		Fire extinguishers for Sub Contractors if applicable	no	2		
2.9.3		Fire extinguishers test certificate for main and sub contractors	no	5		
2.10 Personal protective clothing						
2.10.1		Allow for the cost of the following PPE as required on site by workers (number of each to be determined by the Tenderer)	sum	1		
2.10.2		Hard hats				
2.10.3		Safety Shoes				
2.10.4		Dust Masks				
2.10.5		Safety Goggles				
2.10.6		Gum Boots				
2.10.7		Overalls				
		Safety harnesses				
2.11 Chemical toilets						
2.11.1		Allow for toilet facilities on site as required by specifications				
2.11.2		For male workers	no	3		
		For female workers	no	3		
2.12 Eating facilities						
2.12.1		Allow for eating facilities on site in the form of a shaded net, table and chairs	no	1		
2.13 Signs						
2.13.1		Allow for signboards to be displayed on site as required	sum	1		
2.13.2		SMI board				
2.13.3		No entry signs				
2.13.4		First Aid signs				
2.13.5		Fire equipment signs				
2.13.6		Warning signs (Construction area boards)				
2.13.7		Traffic control signs (mechanical & pedestrian)				
2.13.8		Fire siren				
		Name boards on construction vehicles				
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 1 4						
BILL OF QUANTITIES PAGE NUMBER 1 3						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS 1 200		Schedule 2 continued Occupational health and safety requirements				
-\SCHEDULE CONTINUED FROM PAGE 13						
2.14 Medical tests						
2.14.1		Appointment of a competent person to perform medical tests to all employees Allow for medical tests of workers as medical fitness tests for all employees	sum	1		
2.15 Barricading & demarcation						
2.15.1		Allow for proper barricading and demarcation of streets to direct public and vehicles	sum	1		
2.16 Health & Safety agent						
2.16.1		Provisional sum for the appointment of a Health & Safety Agent to act on behalf of the Employer to ensure adherence of the Contractor to all Health & Safety requirements	Prov	1		130,000.00
SCHEDULE 2 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 14						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule 3				
1 200		2,5 Mℓ capacity elevated water tower				
		DRAWING REFERENCE : T01 TO T05				
		Tower				
3.1		Earthworks				
3.1.1	D8.3.1.1	Clear and strip site	m²	1,500		
3.1.2	D8.3.2	Excavate in all materials and stockpile for later use for backfill or embankment or dispose surplus material to remote site found by Contractor	m³	1,530		
3.1.3	D8.3.2.b1	Extra over for excavation in intermediate material	m³	100		
3.1.4	D8.3.2.b2	Extra over for excavation in hard rock material	m³	350		
3.1.5	D8.3.2	Backfill over completed foundation in layers of 150mm with material from stockpile, compacted to 95% Mod AASHTO	m³	1,216		
3.1.6	ME8.3.5	Compact final layer to 97% Mod AASHTO, stabilised with 3% cement Stabilizing agent: Portland cement	m³ t	40 3		
3.1.7		Apply weed killer and insecticide soil poisoning over compacted area below tower	m²	340		
3.1.8		Pave area below tower with 450 x 450 x 50 pre-cast concrete blocks on 25mm sand/cement bedding	m²	450		
3.1.9		Storm water channel around reservoir, 1,5m wide dished and laid to falls to discharge water on paved road, from 25MPa concrete	m³	12		
		Existing services				
3.1.10	D8.3.8	Dig open by hand to expose the following services and backfill: Electrical cables	m	100		
3.1.11		Install 2 x 110mm sleeves in trench including 600 x 600 encasing 600 x600	m	100		
3.1.12	DB8.3.2	Dig new trench, 0,6m wide and 1,0m deep by hand at new position of electrical cable, backfill and re-compact after installation of new cable	m	100		
3.1.13	D8.3.8	Dig open by hand to expose the following services: Water lines	m	75		
3.1.14		Provisional sum for additional Geotech investigation	Prov	1	120,000.00	120,000.00
3.1.15		Provisional sum for Geotech inspections	Prov	1	100,000.00	100,000.00
1.3.11		Provisional sum for the rehabilitation of old tower	Prov	1	4,000,000.00	4,000,000.00
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 16						
BILL OF QUANTITIES PAGE NUMBER 15						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS	1 200	Schedule 3 continued 2,5 Mℓ capacity elevated water tower DRAWING REFERENCE : T01 TO T05				
- \ SCHEDULE CONTINUED FROM PAGE 15						
3.2 Concrete works						
		Foundations				
3.2.1	G8.4.2	75 mm blinding layer laid on excavation platform from 15 MPa concrete at reduced level built with radius of 8 m	m³	90		
3.2.2	G8.4.2	500 mm circular foundation slab from 35 MPa concrete cast at reduced level built with radius of 8m	m³	205		
3.2.3	G8.4.3	Column foundations from 35 MPa concrete - 2,0m x 2,0m x 1,5m high cast at reduced level with sloping top surface to take 0,6 x 1,05 columns	m³	168		
3.2.4	G8.4.3	Shaft foundation from 35 Mpa concrete - 6,4m x 6,4m x 0,5m cast on Circular base at reduced level	m³	21		
3.2.5	G8.4.3	350mm thick circular shaft foundation wall from 35MPa concrete to 2.35m Inside radius up to shaft floor level	m³	20		
3.2.6	G8.4.2	1500mm thick mass concrete infill from 15MPa concrete into cylinder as formed with walls as per item 3.1.5, from foundation level to floor level	m³	60		
3.2.7	G8.4.2	170mm thick floor slab in shaft from 35MPa concrete	m³	5		
		Access shafts				
3.2.8	G8.4.3	350mm access shaft from 35 Mpa concrete between raduises 2,35m and 2,7m to 21m above ground level - onto walls as per item 3.1.5	m³	119		
3.2.9	G8.4.3	250mm final shaft from 35 Mpa concrete between radiuses 1,0m and 1,25m at heights from 21m to 29,4m above ground level	m³	18		
3.2.10	G8.4.3	250mm thick staircase landings at various levels including final landing at 18,6m above ground level	m³	7		
		Columns				
3.2.11	G8.4.3	12 no. of perimeter columns from 35 MPa concrete with depth ranging from 1,05m at the base to 0,7m at springing level and constant width of 0,6m	m³	150		
3.2.12	G8.4.3	24 no. of 350 x 350 inside columns from 35MPa starting on the tank floor 21m above ground level and supporting the tank roof slab	m³	40		
		Stiffner beams				
3.2.13	G8.4.3	Stiffner beams of sizes 500mm x 750mm with flat soffit from 35MPa concrete at 6m & 13m above ground level - Beam type T5 & Beam type T6	m³	92		
3.2.14	G8.4.3	Arched beams with circular soffit above springing level at 17,6 to 19,6m above ground level - Beam type T3	m³	93		
		Tank floor and beams				
3.2.15	G8.4.3	350mm circular tank floor slab from 350MPa concrete, cast at 21,5m above ground level built with radius of 10.75m	m³	130		
3.2.16	G8.4.3	Beams of various sizes with flat soffit from 35MPa concrete at tank floor level, cast monolithic with floor slab as per item 3.2.15	m³	80		
		Tank roof slab, beams and access manholes				
3.2.17	G8.4.3	200mm circular roof slab cast at a slope of 8° from 35MPa concrete from 29m to 30m above ground level - Lower roof	m³	60		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 17						
BILL OF QUANTITIES PAGE NUMBER 16						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS Schedule 3 continued 1 200 2,5 Mℓ capacity elevated water tower DRAWING REFERENCE : T01 TO T05						
- \ SCHEDULE CONTINUED FROM PAGE 16						
3.2.18	G8.4.3	150mm circular roof slab with flat soffit from 35MPa concrete cast at 30m above ground level - Upper roof	m³	5		
3.2.19	G8.4.3	Beams of various sizes with flat soffit from 35MPa concrete at tank roof level, cast monolithic with roof slab as per item 3.1.15 & 3.1.16 - Beam type R1 & Beam type R2	m³	13		
3.2.20	G8.4.3	150mm x 450mm sloping ledge with flat soffit from 35MPa concrete cast at tank roof level along perimeter of tank	m³	11		
3.2.21	G8.4.3	Tank Wall 350mm tank wall from 35 Mpa concrete between raduises 10.4m and 10.75m cast at 22m above ground level with 50mm recesses as shown	m³	185		
3.2.22	PSG3.5.1	Extra over items 3.2.8 to 3.2.21 for Penetron waterproofing additive as specified in PSG 3.5.1 at a rate of 0,8% by weight of cementitious content in the concrete mix	m³	1,500		
3.3 Reinforcement - see drawings R01 to R06						
3.3.1	G8.3.1	High tensile reinforcement of various diameter for foundation slab & footings	kg	24,000		
3.3.2	G8.3.1	Hight tensile reinforcement of various diameter for shafts & tank wall	kg	24,700		
3.3.3	G8.3.1	Hight tensile reinforcement of various diameter for columns	kg	22,200		
3.3.4	G8.3.1	Hight tensile reinforcement of various diameter for beams T5 & T6	kg	8,000		
3.3.5	G8.3.1	Hight tensile reinforcement of various diameter for tank floor slab & beams	kg	30,000		
3.3.6	G8.3.1	Hight tensile reinforcement of various diameter for tank roof slab & beams	kg	15,000		
3.3.9	G8.3.1	Hight tensile reinforcement of various diameter for landings	kg	1,000		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 18						
BILL OF QUANTITIES PAGE NUMBER 17						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS 1 200		Schedule 3 continued 2,5 Mℓ capacity elevated water tower DRAWING REFERENCE : T01 TO T05				
- \ SCHEDULE CONTINUED FROM PAGE 17						
3.4		Form work				
3.4.1	G8.2.2	Smooth vertical curving form work to foundation slab sides with radius of 10.8 m - 500mm high at reduced level	m²	40		
3.4.2	G8.2.2	Smooth vertical form work to column footings - 3500mm high at reduced level (12No.)	m²	364		
3.4.3	G8.2.2	Smooth vertical form work to center footing - 500mm high at reduced level	m²	13		
3.4.4	G8.2.2	Smooth vertical form work to tapered columns from ground level to 22m above ground including arched shape as shown (12No.) including 25 x 25 chamfer along all corners	m²	886		
3.4.5	G8.2.2	Smooth vertical curving form work to inside of access shaft with radius of 2.35 m from ground level to 22m above ground	m²	347		
3.4.6	G8.2.2	Smooth vertical curving form work to outside of access shaft with radius of 2.7 m from ground level to 22m above ground	m²	400		
3.4.7	G8.2.2	Smooth vertical curving form work to inside of final shaft with radius of 1.0 m from 22m to 30m above ground	m²	64		
3.4.8	G8.2.2	Smooth vertical curving form work to outside of final shaft with radius of 1.25 m from 22m to 30m above ground	m²	79		
3.4.9	G8.2.2	Smooth vertical curving form work to inside of tank wall with radius of 10.4 m from 22m to 28m above ground	m²	510		
3.4.10	G8.2.2	Smooth vertical curving form work to outside of tank wall with radius of 10.75 m from 22m to 28m above ground	m²	525		
3.4.11	G8.2.2	Smooth vertical form work to sides of stiffner beams at 6m & 13m above ground level (Beams T5 & T6) - 24No. Each	m²	370		
3.4.12	G8.2.2	Smooth horizontal form work to soffits of stiffner beams at 6m & 13m above ground level (Beams T5 & T6) - 24No. Each including 25 x 25 chamfer along all corners	m²	125		
3.4.13	G8.2.2	Smooth horizontal form work to soffits of landings at various levels up to 19m above ground level including 25 x 25 chamfer along all corners	m²	16		
3.4.14	G8.2.2	Smooth vertical form work to sides of landings at various levels up to 19m above ground level - 300mm high	m²	7		
3.4.15	G8.2.2	Smooth horizontal form work to soffit of tank floor slab at 22m above ground level	m²	290		
3.4.16	G8.2.2	Smooth vertical form work to sides of tank floor beams at 22m above ground level (Beams T1 & T2 & T4) - 12No. Each	m²	200		
3.4.17	G8.2.2	Smooth horizontal form work to soffits of tank floor beams at 22m above ground level (Beams T1 & T2 & T4) - 12No. Each including 25 x 25 chamfer along all corners	m²	74		
3.4.18	G8.2.2	Smooth vertical form work to sides of arched tank floor beams at 22m above ground level (Beam T3) - 12No.	m²	210		
3.4.19	G8.2.2	Smooth horizontal curved form work to soffits of arched tank floor beams at 22m above ground level (Beam T3) - 12No. including 25 x 25 chamfer along all corners	m²	39		
3.4.20	G8.2.2	Smooth vertical form work to roof support columns at 0m to 7m above tank floor level - 12No. & 12No. including 25 x 25 chamfer along all corners	m²	279		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 19						
BILL OF QUANTITIES PAGE NUMBER 18						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS Schedule3 continued 1 200 2,5 Mℓ capacity elevated water tower DRAWING REFERENCE : T01 TO T05						
- \ SCHEDULE CONTINUED FROM PAGE 18						
3.4.21	G8.2.2	Smooth horizontal form work to soffit of roof slab at an angle of 10.8° at 6m to 8m above tank floor level	m²	340		
3.4.22	G8.2.2	Smooth vertical form work to sides of tank roof beams at 6m above tank floor level (Beams R1 & R2) - 12No. Each	m²	92		
3.4.23	G8.2.2	Smooth horizontal form work to soffits of tank roof beams at 6m above tank floor level (Beams R1 & R2) - 12No. Each including 25 x 25 chamfer along all corners	m²	38		
3.4.24	G8.2.2	Smooth horizontal formwork to soffit of perimeter ledge at 29m above ground level including drip groove & chamfers	m²	31		
3.4.25	G8.2.2	Smooth vertical curving form work to roof ledge at 29m above ground level - 100mm high	m²	7		
3.4.26	G8.2.2	Smooth vertical form work to roof access	m²	2		
3.4.27	G8.2.2	Form 4,60m x 1,65m x 50mm deep recesses to outside of tank wall to match existing	no	24		
3.5 Concrete surface finishing						
3.5.1	G8.4.4	Uniform wood float finish on foundation slab	m²	462		
3.5.2	G8.4.4	Uniform wood float finish on top face column footings	m²	125		
3.5.3	G8.4.4	Uniform wood float finish on top face of centre footing	m²	41		
3.5.4	G8.4.4	Uniform wood float finish to top of landing surfaces	m²	17		
3.5.5	G8.4.4	Uniform steel trowel finish on top of tank floor	m²	339		
3.5.6	G8.4.4	Uniform wood float finish to top of tank roof	m²	387		
3.6 Waterproofing						
3.6.1		Joint between tank wall and floor with 200mm wide combiflex bandage system (Sikaflex of similar) both sides of concrete fillet	m	100		
3.6.2		Joint between tank floor and shaft with 200mm wide combiflex bandage system and 50 x 50 polyethelene foam trinagular fillet	m	8		
3.6.3		Horizontal wall construction joint with 150mm wide combiflex bandage system	m	65		
3.6.4		Horizontal joint between wall and roof beam with 150mm wide Combiflex bandage system	m	50		
3.6.5		10 x 20 Swellable sealant (Penetron penebar or Sikaswell) around pipes passing through tank floor	m	10		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 20						
BILL OF QUANTITIES PAGE NUMBER 19						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule 3				
1 200		2,5 Mℓ capacity elevated water tower				
DRAWING REFERENCE : T01 TO T05						
- \ SCHEDULE CONTINUED FROM PAGE 19						
3.7 Steel works						
3.7.1	HA8.3.1	Manufacture, deliver and install the following: Steel staircase in main shaft including handrails, all from stainless steel 304 L as detailed on drg. St01	Item			
3.7.2	HA8.3.1	Steel cat ladder in access shaft from SS 304L as per drg. St02	Item			
3.7.3	HA8.3.1	Steel cat ladder to inside of tank from SS 304L as per drg. St03	Item			
3.7.4		Steel hand grip from SS 304L on roof at manholes	Set	2		
3.7.4	HA8.3.1	Stainless steel Mentis handrailing system, 1m high on following: 1) Straight on edge of final landing 2) Curved at 2,7m radius around roof access manhole	m m	7 17		
3.7.5	HA8.3.1	Steel cover on access shaft, including access lid, hinges, handles lock etc. from stainless steel 3CR12 as detailed on drg. St03	Item	1		
3.7.6	HA8.3.1	Steel cover to tank access manhole including lid, hinges, handles lock etc. from stainless steel 3CR12 as detailed on drg. St03	Item	1		
3.7.7	HA8.3.1	2,1m x 0,9m vandal proof security door with relative protection level of 5, including frame with hidden hinges and security lock, all from 304L stainless steel	no	1		
3.7.8	HA8.3.1	0,4m wide x 1,0m high vandal proof large airflow louvres with with double bent blades and fitted with vermin proofing inside, all from 304L stainless steel	no	16		
3.7.9	HA8.3.1	4.5mm x 250mm x 7.8m SS 304L plate perforated with 6mm holes @ 50mm c/c, bent at a radius 1.25m as vent for final shaft	no	1		
3.8 Miscellaneous items						
		Manufacture, deliver and install the following:				
3.8.1	HA8.3.1	500Ø Stainless steel pipe clamps as detailed	no	16		
3.8.2	HA8.3.1	Ditto but 450Ø	no	5		
3.8.3	HA8.3.1	Ditto but 150Ø	no	5		
3.8.4	HA8.3.1	50mm Stainless steel safety hook cast in roof slab	no	2		
3.8.5	HA8.3.1	100Ø 304L SS roof ventilator as detailed on drg St03	no	4		
3.8.6	HA8.3.1	100Ø 304L SS sleeve with cover flange cast in roof slab	no	3		
3.8.7		110Ø class 9 HDPE scour pipe to towers	m	30		
3.8.8		Steel inspection tower on roof, 300Ø x 1,0m high, closed on top with hinged lid	no	3		
SCHEDULE 3 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 20						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule 4				
1 200		Pump station and guard hut				
		DRAWING REFERENCE: PO1 TO PO3				
4.1		Pump station				
4.1.1		Earthworks for pump station				
4.1.1.1	D8.3.2a	Excavate in bulk and stockpile for later use for backfill or embankment or dispose surplus material to remote site found by Contractor	m³	326		
4.1.1.2	D8.3.2.b1	Extra over for excavation in intermediate material	m³	20		
4.1.1.3	D8.3.2.b2	Extra over for excavation in hard rock material	m³	5		
4.1.1.4	D8.3.5	Extra over excavations for working space	m²	62		
4.1.2		Concrete works				
4.1.2.1	G8.4.2	75 mm thick blinding layer under floor slabs from 15 mPa concrete	m²	150		
4.1.2.2	G8.4.3	250 mm floor slab from 30 Mpa concrete	m³	50		
4.1.2.3	G8.4.3	250 and 300 mm walls from 30 Mpa concrete	m³	35		
4.1.2.4	G8.4.3	150mm floor slab and steps from 30MPa	m³	6		
4.1.2.5	G8.4.3	200 - 255 roof slab with upstand beams	m³	62		
4.1.2.6	G8.4.3	100mm Concrete work top in telemetry room	m³	1.5		
4.1.2.7	G8.4.3	Pipe encasings from 25 Mpa concrete	m³	4		
4.1.2.8	PSG3.5.1	Extra over 4.1.2.2 - 4.1.2.5 for Penetron waterproofing additive as specified in PSG 3.5.1 at a rate of 0,8% by weight of cementitious content in the concrete mix	m³	145		
4.1.2.8	G8.3.1	High tensile reinforcement for floor, walls & roof	kg	15,300		
4.1.2.9	G8.1.2.2	Mild steel reinforcement for floor, walls & roof	kg	435		
4.1.2.10	G8.2.2	Smooth vertical form work to walls	m²	155		
4.1.2.11	G8.2.2	Smooth vertical form work to roof upstands & channel sides	m²	115		
4.1.2.12	G8.2.2	Smooth horizontal form work to underside of roof slab	m²	230		
4.1.2.13	G8.4.4	Uniform wood float finish on roof slab	m²	230		
4.1.2.14	G8.1.1.2	Construct 25 mm x 25 mm chamfers on exposed concrete edges	m	280		
4.1.2.15	G8.1.1.2	Construct drip groove at roof slab	m	65		
4.1.2.16	G8.2.6	Form opening in wall for 700 mm Ø pipe and repair after positioning of pipe with 30MPa concrete and water proof	no	1		
4.1.2.17	G8.2.6	Form opening in wall for 400 mm Ø pipes and repair after positioning of pipes with 30MPa concrete and water proof	no	4		
4.1.2.18		Form 450 x 450 x 450 de-watering sump in floor	no	1		
4.1.2.19		Apply 2 layers epoxy based floor paint on pump station floor	m²	105		
4.1.3		Building work				
4.1.3.1		230mm Wide brick work using solid clay bricks of 10MPa (min.) in class II mortar. Brickforce every 4th layer and damp course at the bottom. Pre-cast lintols over all door openings.	m²	255		
4.1.3.2		Extra over item 4.3.1 for facebrick on outside with bricks matching existing buildings on the site	m²	210		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 22						
BILL OF QUANTITIES PAGE NUMBER 21						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule 4 continued				
1 200		Pump station and guard hut				
DRAWING REFERENCE: PO1 TO PO3						
-\\SCHEDULE CONTINUED FROM PAGE 21						
4.1.4 Steel works						
4.1.3.3		Extra over item 4.3.1 for plastering on inside with 1:5 sand/cement plaster and painted with one layer undercoat and 2 layers low-gloss enamel paint	m²	295		
4.1.4.1	HA8.3.1	Manufacture, deliver and install the following: 2,1m x 0,9m vandal proof security door with relative protection level of 5, including frame with hidden hinges and security lock, all from 304L stainless steel	no	2		
4.1.4.2	HA8.3.1	3m x 1,5m vandal proof security door with relative protection level of 5, including frame with hidden hinges and security lock, all from 304L stainless steel	no	1		
4.1.4.3	HA8.3.1	0,87m wide x 0,5m high vandal proof large airflow louvres with double bent blades and fitted with vermin proofing inside, all from 304L stainless steel	no	12		
4.1.4.4	HA8.3.1	Overhead crane structure consisting of 152 x 152 x 23kg/m I-columns with 250 x 250 x16 baseplate, 254 x 146 x 31kg/m and 203 x 133 x 23kg/m I-beams, all from heavy duty galvanised grade W350 mild steel	kg	3,600		
4.1.5 Miscellaneous items						
4.1.5.1	HA8.3.1	Manufacture, deliver and install the following: 200x75x25kg/m back to back channel crawl beam fixed to concrete roof slab and cantilevering 1,5m one end	kg	250		
4.1.5.2	HA8.3.1	3 Ton single crane beam on hand geared trolleys, including 3 ton mechanical hoist	no	1		
4.1.5.3	HA8.3.1	3 Ton mechanical operated hoist for crawl beam	no	1		
4.1.5.4	HA8.3.1	Stainless steel Mentis handrailing system, 1m high	m	20		
4.1.5.5	HA8.3.1	Stainless steel rectgrid trench grid with 40 x 40 angle frame to cover 450mm wide cable trench, in lengths of 2,0m max.	m	24		
4.1.5.6	HA8.3.1	Stainless steel rectgrid trench grid with 40 x 40 angle frame to cover 700mm wide cable trench, in lengths of 2,0m max.	m	5		
4.1.5.7	HA8.3.1	200x75x25kg/m back to back channel beam in cable trench to support MCC cabinets	kg	1,000		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 23						
BILL OF QUANTITIES PAGE NUMBER 22						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
	SANS 1 200	Schedule 4 Pump station and guard hut DRAWING REFERENCE: P01 TO P03				
- \ SCHEDULE CONTINUED FROM PAGE 22						
4.1.2.10		Supply and install 100Ø uPVC sleeves for electrical and telemetry cables	m	60		
4.1.2.11		Supply and install 100Ø uPVC lang radius bends for electrical and telemetry cables	no	10		
4.2 Guard hut						
4.2.1		Construct guard hut as detailed on drawing P03, complete with foundations, walls, doors and windows, roof slab and electrical and plumbing installations	Item	1		
SCHEDULE 4 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 23						

Contractor

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Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS Schedule 5 1 200 Security wall						
5.1 Site clearance and Earthworks						
5.1.1	C8.2.5	Take down existing concrete palisade fence, including concrete bases and existing security gate and dispose to dumping site found by Contractor	m	460		
5.1.2	C8.2.1	Clear and grub fence route, 2m wide and dispose to dumping site found by Contractor	m	460		
5.1.3	D8.3.2	Excavate in all materials and dispose for posts and ground beam below fence route	m³	140		
5.2 Concrete works						
5.2.1	G8.4.1	Formwork: Rough to sides of bases where required	m²	100		
5.2.2	G8.4.2	High tensile reinforcement in bases	kg	8,000		
5.2.3	G8.4.3	Cast from 25MPa concrete, 1,75m x 1,5m x0,35 bases for posts	m³	100		
5.2.4		Supply and install 860mm high Precast Concrete Crash Barriers along street edge	m	80		
5.3 Precast wall						
5.3.1	G8.4.1	Supply and install 460 x 460 x 4.0m long precast normal reinforced concrete columns from 35MPa concrete with cast-in steel baseplate and 4 x M20 holding down bolts.	no	100		
	G8.4.3	Supply and install 150mm thick x 1,2m wide precast, prestressed hollowcore slabs from 60MPa concrete, cut in suitable lengths not exceeding 6m, stressed to 25MPa internal stress after losses	m	1,700		
		Supply and install razor wire flat wrap coil on top of precast boundary wall	m	600		
5.3.2		Electrical fence on inside, attached to 75 x 75 posts with energizer fitted in guard house	m	460		
5.3.3		Manual operated security sliding gate with same specification as above in 75 x 100 square tubing frame with wheels and rail. Slider support should be able to support 10 ton truck. Must be lockable with lock protection (anti-cut and anti-tamper)	no	2		
SCHEDULE 5 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 24						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS Schedule 6 1 200 Chambers DRAWING REFERENCES SO6						
6.1 Earthworks						
6.1.1	D8.3.2a	Excavate in bulk and dispose excess material to remote site found by Contractor	m³	260		
6.1.2	D8.3.2.b1	Extra over for excavation in intermediate material	m³	20		
6.1.3	D8.3.2.b2	Extra over for excavation in hard rock material	m³	10		
6.1.4	D8.3.5	Extra over excavations for working space	m³	113		
6.2 Concrete works						
6.2.1	G8.4.2	75 mm thick blinding layer under floor slabs from 15 mPa concrete	m²	100		
6.2.2	G8.4.3	250 mm floor slab from 30 Mpa concrete	m³	30		
6.2.3	G8.4.3	250mm walls from 30 Mpa concrete	m³	25		
6.2.4	G8.4.3	100mm Concrete work top in telemetry room	m³	5		
6.2.5	PSG3.5.1	Extra over 6.2.3 for Penetron waterproofing additive as specified in PSG 3.5.1 at a rate of 0,8% by weight of cementitious content in the concrete mix	m³	30		
6.2.6	G8.4.3	Cast and install 200mm thick precast roof slabs in the following sizes, including formwork, openings, holes etc. with wood float finish: (Reinforcing measured elsewhere)				
		3.5m x 2,5m	no	2		
		3.5m x 1.75m	no	10		
		3.5m x 1.25m	no	4		
		2.5m x 1.75m	no	2		
6.2.7	G8.3.1	High tensile reinforcement for floor, walls & roof	kg	9,950		
6.2.8	G8.1.2.2	Mild steel reinforcement for floor, walls & roof	kg	225		
6.2.9	G8.2.2	Smooth vertical form work to walls	m²	300		
6.2.10	G8.4.4	Uniform wood float finish on floor slab	m²	100		
6.2.11	G8.1.1.2	Construct 25 mm x 25 mm chamfers on exposed concrete edges	m	300		
6.2.12	G8.2.6	Form opening in walls for 700mm Ø pipe and repair after positioning of pipe with 30MPa concrete and water proof	no	1		
6.2.13	G8.2.6	Form opening in walls for 600mm Ø pipe and repair after positioning of pipe with 30MPa concrete and water proof	no	2		
6.2.14	G8.2.6	Form opening in wall for 500 mm Ø pipes and repair after positioning of pipes with 30MPa concrete and water proof	no	4		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 26						
BILL OF QUANTITIES PAGE NUMBER 25						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS 1 200		Schedule 6 continued Chambers DRAWING REFERENCES S06				
- \SCHEDULE CONTINUED FROM PAGE 26						
6.3		Miscellaneous items				
6.2.15	G8.2.6	Form opening in wall for 350 mm Ø pipes and repair after positioning of pipes with 30MPa concrete and water proof	no	2		
6.2.16	G8.2.6	Form openings in wall for 500 x 300 vents	no	18		
6.2.17	G8.2.6	Form 400 x 400 x 650 de-watering sump in chambers	no	6		
6.3.1	HA8.3.1	Manufacture and install steel cat ladders to inside of chambers from stainless steel 3CR12 as detailed on drg. S104, as follows: 3.0m long 3.5m long	no no	3 1		
6.3.2	HA8.3.1	Steel cover to openings in pre-cast roof slabs, including frame, access lid, hinges, handles, lock etc from stainless steel 3CR12 as detailed on drg. S103	no	5		
6.3.4	HA8.3.1	Steel rectogrid cover to storm water junction box, including steel frame and hinged access cover, all from SS304L as detailed on drg S06	no	8		
6.3.5	HA8.3.1	0.5m wide x 0.3m high vandal proof large airflow louvres with with double bent blades and fitted with vermin proofing inside, all from 304L stainless steel	no	18		
SCHEDULE 6 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 26						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule 7				
1 200		Pipe work				
7.1		Pipe work to water tower - See dwg W01, W02 for layouts and W05 for pipe schedule				
		Manufacture, corrosion protect, deliver and install the following items as specified in CITWIF. Lining: Solvent Free Epoxy, minimum dft 500 microns. Coating: Polyisobutene Visco (PIB) Elastic System with coating thickness of 2300 microns All steel pipe to be Grade X42, Pipe wall thickness for pipes with nominal diameter ≤500mm – t = 4.5mm, Pipe wall thickness for pipes with nominal diameter >500mm - ≤700mm – t = 5.2mm, Pipe wall thickness for pipes with nominal diameter >700mm - ≤900mm – t = 6.0mm Note for clarification – Pipe specials: Where JIS fittings is not available, Manufactured fittings will be allowed upon submission and approval of shop drawings, submitted by the contractor (manufactured as per BS 534-1990 as amended). Note for clarification – Corrosion protection of pipe couplings: System used shall be compatible with PIB coating system as specified for all pipework. Cost for material and labour for corrosion protection of couplings included in cost of pipe elements as per specification.				
7.1.1		Item T01 - 500Ø FLANGED BELLMOUTH WITH PUDDLE FLANGE	no	1		
7.1.2		Item T02 - 500Ø EXPANSION JOINT COUPLING	no	2		
7.1.3		Item T03 - 500Ø PIPE, FLANGED BOTH ENDS	no	12		
7.1.4		Item T04 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.5		Item T05 - 500Ø LONG RADIUS FLANGED BEND EXTENDED WITH DUCKFOOT	no	1		
7.1.6		Item T06 - 500Ø PIPE, FLANGED BOTH ENDS	no	4		
7.1.7		Item T07 - 500Ø x 90° LONG RADIUS BEND ONE END FLANGED OTHER END PLAIN	no	1		
7.1.8		Item T08 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.9		Item T09 - 500Ø PIPE, FLANGED BOTH ENDS WITH PUDDLE FLANGE	no	1		
7.1.10		Item T10 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.11		Item T11 - 500Ø LONG RADIUS FLANGED BEND EXTENDED WITH DUCKFOOT	no	1		
7.1.12		Item T12 - 150Ø FLANGED BELLMOUTH WITH PUDDLE FLANGE	no	1		
7.1.13		Item T13 - 150Ø PIPE, FLANGED BOTH ENDS	no	4		
7.1.14		Item T15 - 150Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.15		Item T16 - 150Ø LONG RADIUS FLANGED BEND WITH DUCKFOOT	no	1		
7.1.16		Item T17 - 150Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.17		Item T18 - 150Ø LONG RADIUS FLANGED BEND	no	1		
7.1.18		Item T19 - 450Ø FLANGED BELLMOUTH	no	1		
7.1.19		Item T20 - 450Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.20		Item T21 - 450Ø PIPE, FLANGED BOTH ENDS WITH PUDDLE FLANGE	no	1		
7.1.21		Item T22 - 450Ø EXPANSION JOINT COUPLING	no	1		
7.1.22		Item T23 - 450Ø PIPE, FLANGED BOTH ENDS	no	5		
7.1.23		Item T24 - 450Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.24		Item T25 - 450Ø LONG RADIUS FLANGED BEND ONE END EXTENDED WITH DUCKFOOT	no	1		
7.1.25		Item T26 - 450Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.26		Item T27 - 450Ø TO 150Ø UNEQUAL FLANGED TEE	no	1		
7.1.27		Item T28 - 450Ø PIPE, FLANGED BOTH ENDS	no	1		
7.1.28		Paint items 1 to 27 above with re-coatable polyurethane paint	Item		Incl	
7.2		Pipe work to pump station - see dwg W03 for layouts, W06 for pipe schedule				
7.2.1		Item P01 - 700Ø FLANGED PIPE WITH PUDDLE FLANGE AND 50mm SOCKET	no	1		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 28						
BILL OF QUANTITIES PAGE NUMBER 27						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS 1 200		Schedule 7 continued Pipe work				
- \SCHEDULE CONTINUED FROM PAGE 27						
7.3 Pipe work to site works						
7.2.2		Item P02 - 700Ømm x 450mm x 45° ECCENTRIC Y-PIECE	no	3		
7.2.3		Item P03 - 700Ø FLANGED PIPE WITH 50mm SOCKET	no	2		
7.2.4		Item P04 - 700Ø x 400Ø CONCENTRIC FLANGED LONG REDUCER	no	1		
7.2.5		Item P05 - 400Ø BLANC FLANGE	no	1		
7.2.6		Item P07 - 450Ø FLANGED PIPE WITH 3 x 50mm SOCKETS	no	3		
7.2.7		Item P08 - 450Ø x 300Ø ECCENTRIC FLANGED LONG REDUCER	no	3		
7.2.8		Item P09 - 400Ø x 250Ø CONCENTRIC FLANGED REDUCER	no	3		
7.2.9		Item P10 - 400Ø x 90° FLANGED LONG RADIUS JIS ELBOW.	no	3		
7.2.10		Item P11 - 400Ø FLANGED PIPE WITH 3 x 50mm SOCKETS	no	3		
7.2.11		Item P13 - 400Ø ONE-END FLANGED PIPE WITH No.4 80 x 60 x 6mm ANGLE CLEATS	no	3		
7.2.12		Item P15 - 400Ø FLANGED PIPE	no	3		
7.2.13		Item P17 - 400Ø FLANGED PIPE WITH PUDDLE FLANGE	no	4		
7.2.14		Item P18 - 400Ø FLANGED PIPE	no	3		
7.2.15		Item P19 - 4400Ø x 90° FLANGED LONG RADIUS JIS ELBOW	no	4		
7.2.16		Item P20 - 700Ømm x 400mm SWIFT T-PIECE	no	4		
7.2.17		Item P21 -700Ø FLANGED PIPE	no	3		
7.2.18		Item P22 - 700Ø FLANGED PIPE	no	2		
7.2.19		Paint items 1 to 18 above with re-coatable polyurethane paint	Item		Incl	
See dwg W04 for pipe layout and W07 to W08 for pipe schedules						
1. Pipe work - Sution from existing 700dia pipe						
7.3.1		Item 1.1 - 700Ø FLANGE WELDED SKEW ONTO EXISTING PIPE	no	1		
7.3.2		Item 1.2 - 700Ø PIPE, FLANGED BOTH ENDS ONE SIDE WELDED SKEW MATCHING EX	no	1		
7.3.3		Item 1.3 - 700Ø PIPE, FLANGED BOTH ENDS	no	13		
7.3.4		Item S01- 700Ø LONG RADIUS FLANGED	no	1		
2. Pipe work - 700dia pipe aligned with pump station						
7.3.5		Item 2.1 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.6		Item 2.2 - 700Ø TO 450Ø FLANGED UNEQUAL TEE	no	4		
7.3.7		Item 2.3 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.8		Item 2.5 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.9		Item 2.6 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.10		Item 2.7 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.11		Item 2.8 - 450Ø LONG RADIUS FLANGED	no	1		
7.3.12		Item 2.9 - 450Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.13		Item 2.11 - 450Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.14		Item 2.12 - 700Ø TO 450Ø ECCENTRIC FLANGED REDUCER	no	1		
7.3.15		Item 2.13 - 450Ø PIPE, FLANGED BOTH ENDS	no	4		
7.3.16		Item 2.14 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.17		Item 2.15 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.18		Item S02 - 700Ø LONG RADIUS FLANGED	no	1		
3. Pipe work through outlet chamber to new tower inlet						
7.3.19		Item 3.1 - 700Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.20		Item 3.2 - 700Ø PIPE, FLANGED BOTH ENDS WITH PUDDLE FLANGE	no	1		
7.3.21		Item 3.3 - 700Ø TO 600Ø ECCENTRIC FLANGED REDUCER	no	1		
7.3.22		Item 3.4 - 600Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.23		Item 3.6 - 600Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.24		Item 3.7 - 600Ø PIPE, FLANGED BOTH ENDS WITH PUDDLE FLANGE	no	1		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 29						
BILL OF QUANTITIES PAGE NUMBER 28						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS 1 200	Schedule 7 continued Pipe work					
- \SCHEDULE CONTINUED FROM PAGE 28						
7.3	Pipe work to site works					
7.3.25		Item 3.8 - 600Ø PIPE, FLANGED BOTH ENDS	no	2		
7.3.26		Item 3.9 - 600Ø SHORT RADIUS FLANGED BEND	no	2		
7.3.27		Item 3.10 - 600Ø TO 250Ø FLANGED TEE	no	1		
7.3.28		Item 3.11 - 250Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.29		Item 3.13 - 600Ø PIPE, FLANGED BOTH ENDS WITH PUDDLE FLANGE	no	1		
7.3.30		Item 3.14 - 600Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.31		Item 3.15 - 600Ø PIPE, FLANGED BOTH ENDS	no	2		
7.3.32		Item 3.16 - 600Ø TO 350Ø FLANGED, GUSSETED TEE	no	1		
7.3.33		Item S03 - 600mm x 500mm SWIFT T-PIECE	no	1		
7.3.34		Item 3.17 - 600Ø TO 500Ø ECCENTRIC FLANGED REDUCER	no	1		
7.3.35		Item 3.18 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.36		Item 3.20 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.37		Item 3.21 - 500Ø PIPE, FLANGED BOTH ENDS WITH PUDDLE FLANGE	no	1		
7.3.38		Item 3.22 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.39		Item 3.23 - 500Ø LONG RADIUS 30° BEND FLANGED BOTH ENDS	no	1		
7.3.40		Item 3.24 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
		4. Pipe work to existing 600dia pipe to existing tower and network				
7.3.41		Item 4.1 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.42		Item 4.3 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.43		Item 4.4 - 500Ø PIPE, FLANGED BOTH ENDS WITH PUDDLE FLANGE	no	1		
7.3.44		Item 4.5 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.45		Item 4.6 - 500Ø PURPOSE MADE Z-PIECE FROM 2 x SHORT RADIUS, FLANGED BOTH	no	1		
7.3.46		Item 4.7 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.47		Item S04 - 600Ø TO 500Ø x 60° ECCENTRIC Y-PIECE, FLANGED ALL ENDS	no	1		
		5. Pipe work - existing 600dia pipe connecting new pumpstation existing tower/network				
7.3.48		Item 5.1 - 600Ø FLANGE WELDED ONTO EXISTING PIPE	no	2		
7.3.49		Paint items 1 to 48 above with re-coatable polyurethane paint	Item		Incl	
		6. Pipe work - Overflow and scour from new tower to junction box				
7.3.50		Item 6.1 - 450Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.51		Item 6.2 - 600Ø PIPE ONE END FLANGED OTHER END PLAIN WITH PUDDLE FLANGE	no	1		
		7. Pipe work - Outlet from new tower to existing 700dia pipe network				
7.3.52		Item 7.1 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.53		Item 7.2 - 500Ø LONG RADIUS 45° BEND FLANGED BOTH ENDS	no	1		
7.3.54		Item 7.3 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.55		Item 7.4 - 500Ø PIPE, FLANGED BOTH ENDS	no	2		
7.3.56		Item 7.5 - 500Ø PIPE, FLANGED BOTH ENDS	no	2		
7.3.57		Item 7.7 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.58		Item 7.8 - 500Ø PIPE, FLANGED BOTH ENDS	no	1		
7.3.59		Item 7.9 - 500Ø LONG RADIUS FLANGED	no	1		
7.3.60		Item 7.10 - 500Ø PIPE FLANGED ONE END AND CURVED PLATE OTHER END TO FIT 700mm EXISTING PIPE	no	1		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 30						
BILL OF QUANTITIES PAGE NUMBER 29						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS 1 200		Schedule 7 continued Pipe work				
- \SCHEDULE CONTINUED FROM PAGE 29						
7.3.61		8. Pipe work to reservoir bypass Item 8.1 - 350Ø PIPE, FLANGED BOTH SIDES	no	1		
7.3.62		Item 8.2 - 350Ø PIPE, FLANGED BOTH SIDES WITH PUDDLE FLANGE	no	1		
7.3.63		Item 8.3 - 350Ø PURPOSE MADE Z-PIECE FROM 2 x SHORT RADIUS JIS BENDS	no	1		
7.3.64		Item 8.4 - 350Ø PIPE, FLANGED BOTH SIDES	no	1		
7.3.65		Item 8.5 - 350Ø PIPE, FLANGED BOTH SIDES WITH PUDDLE FLANGE	no	2		
7.3.66		Item 8.6 - 350Ø PIPE, FLANGED BOTH SIDES	no	11		
7.3.67		Item 8.7 - 350Ø PIPE, FLANGED BOTH SIDES	no	1		
7.3.68		Item 8.8 - 350Ø x 50° PURPOSE MADE ECCENTRIC Y-PIECE	no	1		
7.3.69		Item 8.9 - 350Ø FLANGE WELDED ONTO EXISTING PIPE	no	2		
7.3.70		Paint items 50 to 69 above with re-coatable polyurethane paint	Item		Incl.	
7.3.71		Provisional sum third party inspections on pipe work	Prov	1	250,000.00	250,000.00
7.3.72	A8.5a	Provisional sums cathodic protection	Prov	1	1,000,000.00	1,000,000.00
7.4 Connections to existing pipe work						
7.4.1		Cut into 75Ø scour to existing tower and connect to new 150Ø balancing pipe	no			
7.4.2		Cut into existing 700Ø underground pipe and connect new 700Ø pipe supply from RW reservoir	no			
7.4.3		Cut into existing 700Ø underground pipe and connect new 500Ø pipe (new tower outlet)	no			
7.4.4		Cut into existing 350Ø underground pipe and connect new 350Ø pipe (RW bypass to towers)	no			
7.4.5		Cut into existing 600Ø underground pipe and connect new 500Ø pipe (old tower inlet)	no			
7.4.6		Cut into existing 350Ø underground pipe and connect new 350Ø pipe	no			
7.5 Earthworks to new pipe works						
7.5.1	8.3.2(a)	Trench excavate in soft material to authorised trench width (1200mm) for depth intervals: Over and Up to 1,0 m 2,5 m	m			
7.5.2	8.3.2(b)	Extra-over for excavation in: (provisional) Intermediate material Hard rock material	m3 m3			
7.5.3	SABS 1200 LB	PIPE BEDDING & BACKFILLING Granular material (G5) for bedding layer and cradle with material from trench excavations, compacted to 90% Mod AASHTO	m3			
7.5.4		Selected fill material (G5) for blanket layer including placing and compaction to 90% Mod AASHTO	m3			
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 31						
BILL OF QUANTITIES PAGE NUMBER 30						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS 1 200		Schedule 7 continued Pipe work				
-\SCHEDULE CONTINUED FROM PAGE 30						
7.5.5		General backfill material from trench excavations including screening, placing and compaction to 90% Mod AASHTO density:	m3			
7.5.6		25MPa concrete in pipe encasing, support blocks, kick blocks including shuttering where required	m3			
7.6 Concrete work to pipe supports						
7.6.1	G8.4.3	Concrete to pipe supports of varies sizes from 30MPa concrete on site, in chambers and in pump station	m3			
7.6.2	G8.2.2	Smooth vertical formwork to side of concrete supports	m²			
7.6.3	G8.2.6	High tensile reinforcement in concrete supports	kg			
SCHEDULE 7 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 31						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands,cents
SANS		Schedule 8				
1 200		Special equipment				
8.1		Pumps				
		NOTE: SEE PARTICULAR SPECIFICATION PP: PUMPS FOR COMPLETE SPECIFICATION FOR THE PUMP SETS. Supply following pumps with duty point 833m³/hr @ 35m head: Horizontal volute casing, single-stage pumps, with ratings and main dimensions to EN 733, long-coupled in back pull-out design or similar. Pump shall flanged to SANS 1123 table 1600/3 and fitted with digital pump meter. Pump shall be fitted with a 3-phase 110kW WEG motor suitable to be used in conjunction with a VSD, and fitted with all required instrumentation as per Particular Specification PP. The tendered price shall include the supply, installation, testing and commissioning of the complete pump set. Full technical specifications of the proposed pump shall be submitted with the Tender.	no	3		
8.2		Flow meters				
		SUPPLY AND INSTALL THE FOLLOWING FULLBORE TURBINE BULK FLOW METERS, FLANGED TO SANS 1123 TABLE 1600/3 FITTED WITH 4 - 20 mA TRANSMITTERS:				
8.2.1		600mmØ Full bore flow in inlet chamber	no	1		
8.2.2		350mmØ Flow meter on reservoir bypass line	no	1		
		SUPPLY AND INSTALL THE FOLLOWING CLAMP-ON ULTRASONIC FLOW METERS WITH 4 - 20 mA TRANSMITTERS:				
8.2.3		500mmØ on inlet & outlet to new tower	no	2		
8.3.4		300mmØ on inlet & outlet to old tower	no	2		
8.3		Pressure reducing valves				
		SUPPLY AND INSTALL THE FOLLOWING SINGER S206-PR OR EQUIVALENT PRESSURE REDUCING VALVES, FLANGED TO SANS 1123 TABLE 1600/3:				
8.3.1		350mmØ Singer PRV	no	2		
8.4		VARIABLE SPEED DRIVES				
8.4.1		Supply variable speed drives suitable to control the speed of 3 phase 380V 110kW induction motors. The tendered price shall include the supply, installation, testing and commissioning of the complete pump set. Full technical specifications of the proposed controller shall be submitted with the Tender.			Measured in Electrical Bill item 12.5.1	
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 33						
BILL OF QUANTITIES PAGE NUMBER 32						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule 8				
1 200		Special equipment				
- \SCHEDULE CONTINUED FROM PAGE 32						
8.5 Non-return valves						
8.5.1		450mmØ Diaphragm TOP-STOP non-return valve flanged to SANS 1123 table 1600/3	no	1		
8.5.2		350mmØ Diaphragm TOP-STOP non-return valve flanged to SANS 1123 table 1600/3	no	1		
8.5.3		400mmØ Slanted seat Tilting Disk Valve	no	3		
8.6 Isolating valves						
		Supply and install the following Wedge-type isolating gate valve, left-hand closing and non-rising spindle				
8.6.1		700mmØ Gate valve with gearbox	no	1		
8.6.2		500mmØ Gate valve with gearbox	no	3		
8.6.3		450mmØ Gate valve with gearbox	no	3		
8.6.4		400mmØ Gate valve with gearbox	no	3		
8.6.5		350mmØ Gate valve with gearbox	no	1		
8.6.6		150mmØ Gate valve with handwheel	no	2		
8.7 Expansion joint couplings						
		Supply and install the following POSIFLEX or similar expansion joint couplings:				
8.7.1		500mmØ	no	2		
8.7.2		450mmØ	no	1		
8.7.3		150mmØ	no	1		
8.8 Flexible couplings						
		Supply and install the following flanged adaptors couplings with restrainer bolts				
8.8.1		700mmØ	no	1		
8.8.2		500mmØ	no	1		
8.8.3		450mmØ	no	4		
8.8.4		400mmØ	no	3		
8.8.5		350mmØ	no	1		
8.9 Air Valve						
		150mmØ PN16 air release valve including 150mmØ isolating valve with handwheel flanged to SANS 1123 table 1600/3	no	2		
SCHEDULE 8 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 33						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

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DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
Schedule 9 Road works, kerbing & storm water DRAWING REFERENCE S03 & S04						
9.1 Road works						
9.1.1	DM8.3.7a	Cut in all materials to stockpile	m³	750		
9.1.2	DM8.3.7b	Extra-over item 9.1.1 for intermediate excavations	m³	230		
9.1.3	DM8.3.7c	Extra-over item 9.1.1 for hard excavations	m³	380		
9.1.4	DM8.3.3	Roadbed preparation compacted to 93% mod AASHTO	m³	210		
9.1.5	DM8.3.5	Selected layer from stockpile compacted to 95% mod AASHTO	m³	210		
9.1.6	ME8.3.3	Construct subbase with G6 material from stockpile and compact to 97% mod AASHTO.	m³	210		
9.1.7	ME8.3.3	Construct base with G5 material from stockpile and compact to 97% mod AASHTO, stabilized with 3% cement by weight	m³	210		
9.1.8	ME8.3.8	Stabilizing agent: Portland cement	ton	13		
9.1.8		Apply weed killer and insecticide soil poisoning over compacted base layer	m²	1,370		
9.1.9	MJ8.2.2	Construct paving complete with 80mm interlocking blocks using SABS approved blocks on 25mm sand bedding	m²	1,370		
9.1.10	MJ8.2.3	Cut units to fit edge restraint	m	360		
9.2 Kerbings						
9.2.1	MK8.2.1	Concrete kerbing with the following pre-cast kerbing: a) Figure 7 semi-mountable kerbs	m	60		
9.2.2		b) Figure 8 mountable kerbs	m	300		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 35						
BILL OF QUANTITIES PAGE NUMBER 34						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS	1 200	Schedule 9 continued Road works, kerbing & storm water DRAWING REFERENCE S03 & S04				
- \ SCHEDULE CONTINUED FROM PAGE 34						
9.3 Stormwater drainage						
9.3.1	8.3.2(a)	Trench excavate in soft material to authorised trench width for depth intervals:				
9.3.2		1,0 m 1,5 m	m ³	80		
9.3.3		1,5 m 2,0 m	m ³	300		
9.3.4		2,0 m 2,5 m	m ³	0		rate only
9.3.5	8.3.2(b)	Extra-over for excavation in: (provisional)				
		Intermediate material	m ³	110		
		Hard rock material	m ³	190		
9.3.6	LE8.2.1	Supply and lay 450Ø class 75D stormwater pipes	m	210		
9.3.7	LE8.2.8	Supply and install S/W junction boxes	no	6		
9.3.8	LE8.2.8	Supply and install 3m wide kerb inlet	no	1		
9.3.9		Construct s/w outlet headwall on 450Ø pipe	no	1		
SCHEDULE 9 TOTAL CARRIED TO SUMMARY PAGE						
BILL OF QUANTITIES PAGE NUMBER 35						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

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DATE :08/09/2025

JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule10				
1 200		Alterations and refurbishment of existing buildings				
10.1		Dismantle. Remove and dispose the following:				
		Dismantle, remove and dispatch to Joburg Water's designated depot:				
10.1.1		All above ground pipes ranging from 225mmØ to 600mmØ under and around existing tower, including valves, meters, etc.	Item	1		
10.1.2		All pipe work in existing pump station mainly 450mmØ, including valves and other equipment	Item	1		
10.1.3		Carefully remove existing pump sets and deliver to designated depot.	No	3		
10.1.4		Dismantle overhead crane beam and stantions	Item	1		
10.1.5		Remove security door to existing tower	Item	1		
10.1.5		Dismantle, remove and dispose staircase in existing tower	Item	1		
10.1.6		Disconnect and remove electrical cables in existing tower	Item	1		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 37						
BILL OF QUANTITIES PAGE NUMBER 36						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS	Schedule10 Continue					
1 200	Alterations and refurbishment of existing buildings					
-\\SCHEDULE CONTINUED FROM PAGE 36						
10.2	Steel works					
10.2.1	HA8.3.1	Manufacture, deliver and install the following: Steel staircase in main shaft including handrails, all from stainless steel 304 L as detailed on drg. St01	Item	1		
10.2.2	HA8.3.1	Steel cat ladder in access shaft from SS 304L as per drg. St02	Item	1		
10.2.3	HA8.3.1	Steel cat ladder to inside of tank from SS 304L as per drg. St03	Item	1		
10.2.4	HA8.3.1	2,1m x 0,9m vandal proof security door with relative protection level of 5, including frame with hidden hinges and security lock, all from 304L stainless steel	no	1		
10.3	Building work					
10.3.1		Break out pipes and other equipment in existing pump station, repair brickwork repaint walls and prepare for new generator	Item	1		
10.3.2		Fill up floor in pump existing pump room with 30MPa concrete	m³	20		
10.3.3		Break out existing door to allow installation of new generator replace door and brick up to match existing building	Item	1		
SCHEDULE 10 TOTAL CARRIED TO SUMMARY						
BILL OF QUANTITIES PAGE NUMBER 37						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

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JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule11				
1 200		Site Works (Earthworks & Retaining Wall)				
11.1		Site Clearance				
11.1.1		Clear and grub: Areas including removal of trees and shrubs up to 1,0 m girth, transport and disposal of debris to designated dumping site within 60 km radius of site	m ²	3,400		
11.1.2		Remove and grub large trees and tree stumps of girth:				
11.1.2.1		Over 1,0 m and up to and including 2,0 m	no	4		
11.1.2.2		Over 2,0 m and up to and including 3,0 m	no	1		
11.1.3		Reclear surfaces (only on instructions from Engineer): Areas	m ²	2,250		
11.1.3		Take down existing fences	km	0.2		
11.1.4		Remove topsoil to nominal depth of 150 mm and stockpile	m ³	340		
11.2		Bulk Earthworks				
11.2.1		Fill and compact with material from stockpile to 95% Mod AASHTO density	m ³	300		
11.2.2		Fill and compact with crushed building rubble stockpiled on site	m ³	50		
11.2.3		Fill with imported G5 material from source found by Contractor	m ³	6,000		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 39						
BILL OF QUANTITIES PAGE NUMBER 38						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule11 Continue				
1 200		Site Works (Earthworks & Retaining Wall)				
- \SCHEDULE CONTINUED FROM PAGE 38						
10.3		Retaining Wall				
		<u>Design Assumptions</u>				
		Wall length	m	160		
		Maximum Wall height	m	4		
		Average Wall height	m	2		
		Face Angle	deg	70		
		Loading conditions	kPa	5		
		Ground surface behind the retaining wall	Level	0°		
		Insitu embankment	Fill			
11.3.1		Foundations				
11.3.1.1		Excavate and hand trim for foundations				
		Soft material	m³	15		
		Intermediate material	m³	10		
		Hard rock material	m³	5		
		Concrete				
11.3.1.2		Supply and place 20MPa concrete in foundations				
11.3.2		Wall & Facings				
11.3.2.1		Supply and install ENVIROWALL precast concrete blocks	m²	350		
11.3.3		Backfill				
11.3.3.1		Place, spread & compact backfill material to Manufacturer's specifications	m³	400		
11.3.3.2		Supply and install geogrid mesh reinforcement	m³	1,600		
11.3.4		Steel Reinforcement				
11.3.4.1		High tensile steel reinforcement to structural concrete work Various diameter bars (To be specified by engineer)	ton	1.6		
11.3.5		Erosion Protection & Drainage				
11.3.5.1		Supply and install bidim A2 for erosion protection	m²	750		
11.3.5.2		Supply & place subsoil drain, incl. 19 mm no fines concrete & 110Dia Flopipe all wrapped in bidim A2	m	160		
11.3.5.3		Outlet pipes every 5m	m	25		
11.3.5.4		Engineers certificate for Retaining Wall	sum	1		
SCHEDULE 11 TOTAL CARRIED TO SUMMARY						
BILL OF QUANTITIES PAGE NUMBER 39						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

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JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule12				
1 200		ELECTRICAL INSTALLATIONS				
12.1		PRELIMINARIES				
12.1.1		Site facilities and workshop	Sum	1		
12.1.2		Water, electricity and telecommunication services	Sum	1		
12.1.3		Guarding of material	Sum	1		
12.1.4		Setting out of works	Sum	1		
12.1.5		Construction programme	Sum	1		
12.1.6		Workshop drawings and "As Built" drawings and operating manuals	Sum	1		
12.1.7		Off-loading of material	Sum	1		
12.1.8		Cleaning of site upon completion of project	Sum	1		
12.1.9		Testing and commissioning of the total project including certificate of compliance	Sum	1		
12.1.10		Supply and installation of signs and notices.	Sum	1		
12.1.11		Site Meetings	Sum	1		
12.1.12		Co-ordination with Civil Contractor, Mechanical Sub-Contractor and Client	Sum	1		
12.1.13		Co-ordination with City Power (Upgrade of CB)	Sum	1		
12.1.14		Amount to comply with all requirements of the OHS Act and the specification	Sum	1		
12.1.15		Insurances as required by the contract.	Sum	1		
12.1.16		Other Preliminary and general costs required by the contractor (furnish details) a) Training	Prov		4,500.00	4,500.00
12.1.17		Provisional Sum for Lightning Protection (Reinstating) on Existing Tower	Sum	1	50,000.00	50,000.00
12.1.18		Provisional Sum for Lightning Protection on New Tower	Sum	1	100,000.00	100,000.00
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 41						
BILL OF QUANTITIES PAGE NUMBER 40						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule12 Continue				
1 200		ELECTRICAL INSTALLATIONS				
- \ SCHEDULE CONTINUED FROM PAGE 40						
12.2		SITE RETICULATION, SITE LIGHTING, MANHOLES AND SLEEVES PIPES				
12.2.1		600/1000V PVC PVC SWA (ECC) PVC cable installed in cable sleeves or in cable trenches with BCEW as specified 185mm ² 4 core with copper conductors - ECC 4mm ² 3 core with copper conductors (Tower-Aviation lights) 6mm ² 3 core with copper conductor (Towers) 6mm ² 4 core with copper conductor (ECC) (Perimeter Lighting) 25mm ² 4 core with copper conductors (ECC) (Generator room/Gatehouse)	m	400		
			m	260		
			m	182		
			m	590		
			m	180		
12.2.2		Termination of 600/1000V PVC PVC SWA (ECC) PVC cable 185mm ² 4 core with copper conductors 4mm ² 3 core with copper conductors 6mm ² 4 core with copper conductors 6mm ² 3 core with copper conductors 25mm ² 4core with copper conductors	Each	8		
			Each	12		
			Each	30		
			Each	24		
			Each	16		
12.2.3		Cable joints for 600/1000V PVC PVC SWA (ECC) PVC cable 185mm ² 4 core with Cu conductors	Each	1		
12.2.4		Cable sleeve pipes: 160mm diameter sleeve pipe 110mm diameter sleeve pipe 50mm diameter sleeve pipe	m	75		
			m	200		
			m	100		
12.2.5		Long radius bends for cable sleeve pipes: 160mm diameter 110mm diameter 50mm diameter	Each	18		
			Each	6		
			Each	2		
12.2.6		Excavation of cable sleeve pipe and cable trenches including backfilling and compaction in the following soil types Soft and pickable material Rock	m ²	150		
			m ²	50		
12.2.7		Perimeter light pole 7,5m MH with 1.5m overhang including Beka LEDLume XP1 45W (6790 Lm)	Each	15		
12.2.8		20 m High Mast light with 6 x 230W LED flood lights at 360Deg.	Each	1		
12.2.9		Manhole complete as per detail	Each	8		
12.2.10		2mm diameter galvanised steel draw wire	m	500		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 42						
BILL OF QUANTITIES PAGE NUMBER 41						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule12 Continue				
1 200		ELECTRICAL INSTALLATIONS				
- \SCHEDULE CONTINUED FROM PAGE 4 1						
12.3		SITE RETICULATION, SITE LIGHTING, MANHOLES AND SLEEVES PIPES				
12.3.1		Distribution boards complete as specified: DB-1 (Pump station) Provisional sum DB-G (Generator Room) Provisional sum DB-GH (Gate House) Provisional sum DB-T1 & T2 (Tower DBs) Provisional sum	Each Each Each Each	1 1 1 2		
12.3.2		Light fittings complete with conduit outlet box and connection to conduit and wiring Type L1 (Pump Station + Towers 1 and 2) Type L2	Each Each	30 14		
12.3.3		Light switch complete with outlet box, cover plate and connection to conduit and wiring 1 lever 1 way flush mounted 1 lever 1 way industrial 1 lever 1 way with IP65 rating industrial Switched socket outlets including outlet box, cover plate and connection to conduit and wiring Double flush mounted Double surface mounted galvanised 40A 3 phase Surface Mount welding socket Industrial single	Each Each Each Each Each Each Each	2 2 2 2 8 2 10		
12.3.4		Isolators including outlet box, cover plate and connection to conduit and wiring 30A double pole flush mounted	Each	2		
12.3.5		Conduit surface mounted on spacer bar saddles or installed recessed in concrete slabs or walls-Galvanised 20mm diameter galvanised 25mm diameter galvanised	m m	100 100		
12.3.6		PVC insulated conductor installed in conduit 2,5mm² 4mm²	m m	300 300		
12.3.7		2,5mm² bare copper earth wire installed in conduit	m	300		
12.3.8		Labelling of all power outlets (lights, switches, socket outlets and welding	Sum	1		
12.3.9		Socket outlets	Sum	1		
12.3.10		Telecom/LAN outlet (100x100 flush draw box with cover plate)	Each	1		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 43						
BILL OF QUANTITIES PAGE NUMBER 42						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

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JOBURG WATER



TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule12 Continue				
1 200		ELECTRICAL INSTALLATIONS				
- \SCHEDULE CONTINUED FROM PAGE 42						
12.4		EARTHING				
12.4.1		Supply and install earthmat- Resistance < 1 Ohm Provisional Amount	Sum	1		
12.4.2		70mm ² bare copper earth wire with terminations	m	10		
12.4.3		Bonding of all metalwork in pump station and towers to earth	Sum	1		
12.4.4		20mm diameter galvanised conduit surface mounted on spacer bar saddles	m	30		
12.4.5		Excavation, bedding, blanketing, backfilling and compaction of earthmats in the following soil types:				
		Soft and pickable material	m ²	10		
		Rock	m ²	5		
12.5		TOWERS (2X) AND PUMPSTATION				
12.5.1		Motor Control Centre (MCC) complete as specified: VSD-3 x 110kW (Specification to be studied in detail and understood to price MCC)				
12.5.2		MCC 1	Each	1		
		600/1000V PVC PVC SWA PVC cable installed in cable sleeves or in cable trenches				
		120mm ² 4 core with copper conductors + 70 mm ² BCEW	m	60		
		6mm ² 4 core + 2.5 mm ² BCEW (Welding Sockets)	m	60		
		2,5mm ² 3 core with copper conductors (control)	m	750		
		1,5mm ² 12 core with copper conductors (control)	m	60		
		1,5mm ² 4 core with copper conductors (E/Stops)	m	170		
		1,5mm ² 7 core with copper conductors (E/Stops)	m	60		
12.5		TOWERS (2X) AND PUMPSTATION				
12.5.3		Termination of 600/1000V PVC PVC SWA (ECC) PVC cable				
		120mm ² 4 core + 70 mm ² BCEW	Each	8		
		4mm ² 4 core + 2.5 mm ² BCEW (Welding Sockets)	Each	4		
		1,5mm ² 4 core	Each	6		
		1,5mm ² 12 core	Each	6		
		1,5mm ² 12 core	Each	12		
		2,5mm ² 3 core	Each	6		
		6mm ² 4 core	Each	4		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 44						
BILL OF QUANTITIES PAGE NUMBER 43						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule12 Continue				
1 200		ELECTRICAL INSTALLATIONS				
- \SCHEDULE CONTINUED FROM PAGE 43						
12.5.4		Supply and install emergency stops at each motor on pedestal or on motor terminal box.				
		Supply and Install emergency stop buttons	Each	3		
12.5.5		JUNCTION BOXES				
		At each motor to accommodate power and instrumentation	Each	3		
		At pressure transducers -Pratley type 1 cable connection box	Each	12		
		At ultrasonic transmitter (Size to suit application-IP65)	Each	7		
12.5.6		300 x 50mm wide cable wire mesh tray and accessories (including all splices, mounting brackets, and fixing material)				
		Cable tray	m	160		
		External bend	Each	4		
		Internal bend	Each	4		
		T-piece	Each	4		
		Horizontal bend	Each	4		
12.5.7		200 x 50mm wide cable wire mesh tray and accessories (including all splices, mounting brackets and fixing material):				
		Cable tray	m	15		
		External bend	Each	1		
		Internal bend	Each	2		
		T-piece	Each	2		
		Horizontal bend	Each	3		
12.5.8		50 x 50mm wide cable wire mesh tray and accessories (including all splices, mounting brackets and fixing materials)				
		Cable tray	m	80		
		External bend	Each	2		
		Internal bend	Each	4		
		T-piece	Each	2		
		Horizontal bend	Each	3		
12.5.9		Galvanised conduit surface mounted on spacer bar saddles				
		20mm diamter	m	50		
		25mm diamter	m	50		
12.5.10		Aviation warning lights				
		Type C light	Each	4		
		Mounting pole as per detail	Each	4		
12.5.11		20m length of 5 core cable and special plug on one end for connection of pump monitor to telemetry marshalling cubicle	Each	3		
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 45						
BILL OF QUANTITIES PAGE NUMBER 44						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/08/2025

JOBURG WATER

TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule12 Continue				
1 200		ELECTRICAL INSTALLATIONS				
- \SCHEDULE CONTINUED FROM PAGE 44						
12.6		INSTRUMENTATION , SENSORS AND TELEMETRY				
12.5.12		Testing and commissioning of complete pumpstation	Sum	1		
12.5.13		Operating and maintenance manuals	Set	1		
12.5.14		Framed drawings	Sum	1		
12.5.15		Induction probe for flood alarm	Sum	1		
12.5.16		Changing over of supply from old pump station to new pump station Stripping out, making safe, transport and delivery to stores of	Sum	1		
12.5.17		Electrical equipment in existing pump station	Sum	1		
12.5.18		Training of operators	Sum	1		
		Complete with transducers but without control panels (Supplied by others)	Each	6		
12.6.2		Pressure transducers including pipe fittings, bleeding valve and connection to junction boxes.				
		Pump suction side with display (Telemetry)	Each	3		
		Pump suction side without display (control)	Each	3		
		Pump delivery side with display (Telemetry)	Each	3		
		Pump delivery side without display (control)	Each	3		
		Supply manifold	Each	1		
		Suction manifold	Each	1		
12.6.3		Hydrostatic level probes for towers				
		Supply and install 4-20mA output	Each	3		
12.6.4		Supply and install complete telemetry system including 24V DC supply all instrumentation -and associated power - supply cable from MCC marshalling cubicle to sensors and to telemetry room. Refer to detailed specification. Preliminary Amount	Prov	1	1,300,000.00	1,300,000.00
12.6.5		Junction Boxes				
		At pressure transducers -Pratley type 1 cable connection box	Each			
		At ultrasonic transmitter (Size to suit application-IP65)	Each			
SCHEDULE SUB TOTAL CARRIED FORWARD TO PAGE 46						
BILL OF QUANTITIES PAGE NUMBER 45						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

CONTRACT JW14402

DATE :08/08/2025

JOBURG WATER

TURFFONTEIN CORRIDORS OF FREEDOM - WATER UPGRADE (FOREST HILL NEW TOWER AND PUMPSTATION)

Item number	Payment reference	Item Description	Unit	Quantities	Rate	Amount Rands.cents
SANS		Schedule12 Continue				
1 200		ELECTRICAL INSTALLATIONS				
- \SCHEDULE CONTINUED FROM PAGE 45						
12.6		INSTRUMENTATION , SENSORS AND TELEMTRY				
12.6.6		Pressure switches including pipe fittings, bleeding valve and connection to junction boxes. (Back up for control purposes)				
		Pump suction side 1B	Each	3		
		Pump delivery side 3.5B	Each	3		
12.7		GENERATOR INSTALLATION				
12.7.1		Supply and install an emergency power supply generator rated at 75% of full load complete with automatic change over panel, complete with 24 hour day tank and communication of all status parameters via telemetry facility at pump station Rating: 600 kVA, 420V, 50Hz @ PF=0.8	EA	Sum		
12.7.2		Civil works related to the mounting of the generator inside an existing room incl. plinths for generator and control panels (if separate)	EA	Sum		
12.7.3		Termination and connection of power supply cables measured elsewhere.	EA	Sum		
12.7.4		Termination and connection of communication cables to MCC/telemetry	EA	Sum		
SCHEDULE 12 TOTAL CARRIED TO SUMMARY						
BILL OF QUANTITIES PAGE NUMBER 46						

Contractor

Witness 1

Witness 2

Employer

Witness 1

Witness 2

Johannesburg Water SOC Ltd



TURFFONTEIN CORRIDORS OF FREEDOM – WATER UPGRADE (FOREST HILL TOWER AND PUMP STATION)

VOLUME 2

PART 3: SCOPE OF WORK

Employer:		Contractor:	
Witness:		Witness:	



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B:	STANDARDISED SPECIFICATIONS	
C:	ALTERATIONS AND ADDITIONS TO STANDARDISED SPECIFICATIONS.	
D:	PARTICULAR SPECIFICATIONS	
	PG: Generator specifications	
	PE: Electrical specifications	
	PP: Pump specifications	
	PR: Rehabilitation of concrete structure of existing Water Tower	

Employer:		Contractor:	
Witness:		Witness:	

C3 SCOPE OF WORK

PORTION 1: PROJECT SPECIFICATION

PS.1 DESCRIPTION OF THE WORKS

PS.1.1 Employer's Objectives

The Employers objective is to enhance the storage capacity of the existing water works at Foresthill in Johannesburg South. This will include the construction of a 2,5 Mℓ elevated concrete storage tank, 20,8m diameter x 7,8m high on a 21,35m high concrete tower, similar to the existing tower and a new pump station with associated appurtenant hydraulic works, valve chambers, telemetry and power system.

The existing tower will be rehabilitated. After completion and commissioning of the new tower and pump station, the existing tower will be de-commissioned and rehabilitated by framework contract JW14404: Panel A and B Contractors – Upgrades and Refurbishment within existing Reservoir and Pumpstation Complexes As and When Basis.

PS.1.2 Overview of the Works

The Works will consist of:

- Site clearing, earthworks, pipe trenching, pipe bedding;
- The construction of a 2,5 Mℓ water Tower;
- The construction of a pump station equipped with new end-suction centrifugal pumps;
- Hydraulic assemblies in various diameters, including pipes, valves, meters and valve chambers;
- Guard hut, security fencing, upgrading of electrical supply and area lighting, telemetry, cathodic protection, access road and storm water drainage.

PS.1.3 Extent of the Works

The following is included in the project:

- Contractor's establishment on site. Provision of safety measures and security for the duration of the contract.
- Ordering of all long lead-time items (valves, pipes, pipe specials, reinforcing and equipment) required for the successful completion of the project within the time, cost, and quality specified.
- Location, exposing and protection of existing services.
- Site Clearance, trenching, trench preparation and compaction, bedding, pipe laying and jointing (welding) of all pipelines stated below.
- Backfilling of trenches, compaction, and reinstatement of surfaces to original state, including boundary walls and fencing where affected.
- Prepare operation and maintenance manuals and as built drawings for handover to the Client.
- De-establishment of the site camp and reinstatement of the site to the original state and handover to the Client.
- Monthly Submission of local labourers' statistics and SMMEs for the duration of the contract.
- Traffic management and traffic accommodation for open trenches through road crossings, in front of dwellings, businesses and anywhere necessary. The Contractor shall make all the necessary arrangements well in advance.
- Construction of an elevated reinforced concrete water tower with a capacity of 2.5 ML
- Construction of All associated pipework and chambers in the reservoir complex

Employer:		Contractor:	
Witness:		Witness:	

- Construction of Pump Station to supply the new tower.
- Construction of a new bulk distribution pipeline
- Supply of standby generator.
- Installation of 85m x 700mm Diameter Steel inlet pipeline to Pumpstation
- Installation of 85m x 350mm Diameter Steel Inlet pipeline to Tower-Pumping main to elevated Tower.
- Installation of 450mm Diameter Steel direct supply pipeline from Rand Water
- Installation of 350mm Diameter Steel Tower Bypass Pipeline
- Installation of 500mm Diameter Steel outlet pipeline from tower
- Installation of 450mm Diameter Steel scour pipeline
- Installation of 600mm Diameter Steel Overflow Pipeline
- Installation of 500mm Diameter Steel outlet pipeline
- Installation of 500 mm Diameter Steel outlet pipeline
- Installation of 350mm Diameter Steel outlet pipeline
- Installation of 550mm Diameter Steel outlet pipe
- Installation of 350mm Diameter valve
- Installation of 150mm Diameter Pressure Reducing Valve

PS.1.4 Location of the Works

The Works are located at Forest Hill in Turffontein, South of Johannesburg, along the M38 (Rifle Range Road) next to Rand Water reservoir complex in Forest Hill.

The centre point coordinates of the reservoir are given in the following table:

Description	Y	X
Centre point of new Tower	95 574.627	+2 905 879.650

PS.1.5 Temporary Works

No temporary works are envisaged under this contract.

Employer:		Contractor:	
Witness:		Witness:	

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 Employer's Agent'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 4

Drawings included in Volume 4 of this Contract Document is for Contractor's information. The drawings that are issued for tender purposes are listed in Returnable Documents in clause T2.3.2

Employer:		Contractor:	
Witness:		Witness:	

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.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.

Employer:		Contractor:	
Witness:		Witness:	

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.

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 20% of the contract value has been identified for this project, the contractor may increase this percentage at his discretion.

The identified scope of work to be subcontracted is listed in SMME BoQs number 1 to 14, however, the main contractor may identify additional works to allocate to SMMEs such as (example purposes):

1. Site clearance of the pipeline route
2. Pipe laying
3. hand excavation where applicable

Employer:		Contractor:	
Witness:		Witness:	7

4. reinstatement

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 minimum 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.

5. The Contractor shall subcontract the local SMME works at the Provisional Sum items allocated for the sections of work in Section 8 of the Bill of Quantities.
6. 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.
7. 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.
8. Before site establishment, the Contractor will provide the following for all SMMEs:
 - a) SMME company registration
 - b) SMME CIDB proof of registration.
9. 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.
10. 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 tool box talks with the SMME Contractor's employees on a daily basis.
 - d) Providing all safety equipment and signage.
 - e) Providing safety training where necessary.
11. 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

Employer:		Contractor:	
Witness:		Witness:	

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.

12. 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
13. 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 set out for the construction of Foresthill Tower as well as the new pump station arising out of the former's failure to comply with instructions issued to him in regard to these requirements.
14. The Contractor shall be required to adopt labour intense construction techniques through the allocated work in Section 8 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.
15. 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.
16. The Contractor shall be required to submit employment data on a monthly basis to the Employer's Agent.
17. 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.
18. **TRAINING OF SMMEs**
The sum shall be in full compensation for the provision of training to SMMEs, to complete 8 the works as per specifications Unit Sum

Employer:		Contractor:	
Witness:		Witness:	

PS.4 COMPLETION OF THE WORKS

The Time for Completion as stated in the Contract Data is 24 months.

PS.5 CONSTRUCTION

PS.5.1 Applicable Standards

PS.5.1.1 National standards

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

SANS 1200 A	General
SANS 1200 AB	Employer's Agent's office
SANS 1200 C	Site clearance
SANS 1200 D	Earthworks
SANS 1200 DB	Earthworks (pipe trenches)
SANS 1200 DM	Earthworks (roads, subgrade)
SANS 1200 G	Concrete (Structural)
SANS 1200 GA	Concrete (Small Works)
SANS 1200 H	Structural steel work
SANS 1200 L	Medium Pressure Pipelines
SANS 1200 LB	Bedding (Pipes)
SANS 1200 LE	Stormwater Drainage
SANS 1200 ME	Subbase
SANS 1200 MJ	Segmented Paving
SANS 1200 MK	Kerbing and channelling
SANS 1123	Jointing system for the steel pipeline
SANS 1200	All valves, fittings and chambers
SANS 966	Pipe fittings and couplings
SANS 135	Bolts and nuts
SANS 136	Bolts and nuts
SANS 1217	Internal lining
SANS 719	Steel specifications
API 1104	Welding

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

Employer:		Contractor:	
Witness:		Witness:	

PS.5.1.2 Other Standards

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

- a) BS8007:1987 Code of Practice for Water Retaining Structures
- b) BS5337:1976 Code of Practice for Water Retaining Structures
- c) BS8110:1997 Code of Practice for Reinforced Concrete design

PS 5.1.2 Particular Generic Specifications

The following Particular Generic Specifications forming part of the Contract have been written to cover phases or items of work involving a specialist type of operations or material to be encountered on this Contract and that are not adequately covered by the general specifications.

Electrical Works	
E01	Electrical Motors - SANS (IEC) 60034-30-1
E02	Electrical Cable Racks - SANS 61537
E03	Electrical Isolator Pushbutton Station (Local Start/Stop) Equipment - SANS 10142-1
E04	Electrical Low Voltage Switchboards and Motor Control Centres - SANS 10142-1
E05	Electrical Low Voltage Power and Control Cable - SANS 10198
E06	Electrical Medium and Low Voltage Cable Installation
E07	Electrical Industrial Plugs, couplers and socket outlets
E08	Electrical Wiring - SANS 10142-1
E11	Earthing and Lightning Protection - SANS 10313
E12	Electrical MV Cables - SANS 10198

PS.6 MANAGEMENT OF THE WORKS

PS.6.1 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.6.2 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.

Employer:		Contractor:	
Witness:		Witness:	

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.

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.6.2.1 Planning

The Contractor shall ensure that he delivers good and services timeously, to not unnecessarily delay other contractors, service providers and suppliers.

PS.6.2.2 Programming

The Contractor shall provide and regularly (maximum monthly) update a Contract Programme. The programme shall at minimum contain:

PS.6.2.2.1 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.6.2.2.2 Tasks:

Where phases or stages are anticipated, this shall be the highest level of division and all tasks related to the

Employer:		Contractor:	
Witness:		Witness:	

successful accomplishment of that phase of the area shall be grouped. Resources allocation and task dependency shall be indicated.

PS.6.2.2.3 Start and Finish Dates:

All tasks shall have specific start and finish dates.

PS.6.2.2.4 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.6.2.2.5 Progress Tracking:

The Contractor shall be required to periodically indicate progress per task graphically and on a percentage basis.

PS.6.2.2.6 Non-working Time:

South African public holidays, weekends and the local traditional annual builder's break shall be incorporated in the programme.

PS.6.2.3 Sequence of the works

The sequence of works to be executed shall be agreed between the Employer's Agent and the Contractor.

PS.6.2.4 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.6.2.5 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.6.3 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.

Employer:		Contractor:	
Witness:		Witness:	

PS.6.4 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.

PS.6.5 Testing, completion, commissioning and correction of defects**PS 6.5.1 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

Employer:		Contractor:	
Witness:		Witness:	

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.

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 6.5.2 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 6.5.3 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.6.6 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.

Employer:		Contractor:	
Witness:		Witness:	

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 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, Linbro Park, Tel.: 012 367 6014

Y = 10 mm/24-hour day

X = 20 mm

STATISTICAL INFORMATION: JOHANNESBURG BOTANICAL GARDENS: 1985-2006		
Month	RAINFALL	
	Nn	Rn
	Actual number of days during the calendar months in which a rainfall of more than Y mm has been received	Average monthly rainfall
January	4.1	116.4
February	3.6	121.3
March	2.6	96.0
April	2.0	30.4
May	0.5	15.2
June	0.1	5.9
July	0.0	1.5
August	0.2	8.7
September	0.3	13.2
October	2.0	66.0
November	3.0	84.5
December	3.8	105.4
TOTAL	21.3	664.6

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.

Employer:		Contractor:	
Witness:		Witness:	

PS.6.7 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),
- 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

Employer:		Contractor:	
Witness:		Witness:	

Part 3: Scope of works

- 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.
- 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

Employer:		Contractor:	
Witness:		Witness:	

- 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

The report format may be amended from time to time by the Employer's Agent. However the initial format shall be finalised by the Employer's Agent in association with the Contractor.

PS.6.8 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.6.9 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.6.10 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.6.11 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.

These shall be submitted to the Employer's Agent on completion of the contract.

PS.6.12 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

Employer:		Contractor:	
Witness:		Witness:	

Part 3: Scope of works

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 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.6.13 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.7 FEATURES REQUIRING SPECIAL ATTENTION

PS.7.1 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.7.2 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.7.3 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.7.4 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

Employer:		Contractor:	
Witness:		Witness:	

will be paid by the Contractor to compensate for the travelling cost, time, etc. of both the Employer's Agent and the Employer.

PS.7.5 Community liaison and community relations

For the purpose of this project, community liaison officers will be required; who shall be required to inform the community with regards to Contractor's activities in particular to this project.

PS.8 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 2: 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

PS.8.1 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:

- Excavation and safeguarding of pile casing and trenches;
- Working in elevated positions
- Scaffolding
- Traffic control;
- Plant and machinery operation;
- Existing services;
- Offloading of material;
- Electrical Distribution boards;
- Electrical Installation;
- Making of steel items

Employer:		Contractor:	
Witness:		Witness:	

- Laying of pipes;
- Placing concrete
- Machine operator;
- Third party exposures;
- Use of portable electrical tools;
- Location of site camp;
- Storage and handling of material;
- Fire prevention and protection;
- Refuelling vehicles/plant;
- Welding;
- Handling of compressed gas cylinders.

Safe work and emergency procedures need to be prepared to address the abovementioned risks.

PS.8.2 Guide to risk assessments

PS.8.2.1 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.

PS.8.2.2 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
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

Employer:		Contractor:	
Witness:		Witness:	

Part 3: Scope of works

Risk rating		Action
1 - 3 =	Serious	Immediate (within 1 week).
4 - 5 =	High	Within 1 month.
6 - 7 =	Moderate	> 4 weeks.
8 - 9 =	Acceptable	No action but will consider from time to time.

Employer:		Contractor:	
Witness:		Witness:	

PS.9 ENVIRONMENTAL MANAGEMENT PLAN

Contractors are to adhere to the mitigation measures listed in the Environmental Management Plan (EMP) (refer to Volume 2: 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.10 HEALTH AND SAFETY AGENT AND ENVIRONMENTAL CONSULTANT

For contact details for the Health and Safety Agent and for the Environmental Consultant, enquire from Joburg Water

PS.11 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.

PS.12 EMPLOYMENT OF LABOUR

PS.12.1 INTERPRETATIONS

PS.12.1.1 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.12.2 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.12.3 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.12.4 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.

Employer:		Contractor:	
Witness:		Witness:	

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.12.5 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.
- 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.12.6 Scheduled Item

PD.12.6.1a 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.

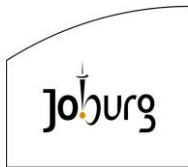
PD12.6.1b Community Liaison Officers – Cellular phone Unit: Provisional Sum

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.

PD12.6.1c Community Liaison Officers – Cellular phone calls Unit: Provisional Sum

.....

Employer:		Contractor:	
Witness:		Witness:	



C4 PROJECT SPECIFICATIONS

A. GENERAL

PS1 CONSTRUCTION WORKS SPECIFICATIONS

PS1.1 APPLICABLE NATIONAL STANDARDS

For the purposes of this Contract, SABS 1200 or SANS 1200 Standardised Specifications applicable to this Contract is listed under B: STANDARDISED SPECIFICATIONS

As from 8 November 2002, all South African standards that were previously published by the South African Bureau of Standards with the prefix "SABS" have been re-designated as South African National Standards and will henceforth be published by Standards South Africa (a division of SABS) with the prefix "SANS" (see Government Notice No. 1373 of Government Gazette 24002).

Note that all standards in existence before 8 November 2002 may be referred to indefinitely, in any context, by either their "SABS" number or by their "SANS" number, both of which will be equally valid.

The prefix "PSA" indicates an amendment to SABS 1200 A General, "PSG" to SANS 1200G Concrete Works Structural, etc. The numbers following these prefixes are the relevant Clause numbers in the relevant SANS 1200 specification. These variations are included under section C3.6 of this document.

VARIATIONS AND ADDITIONS TO STANDARDISED SPECIFICATIONS

Variations and additions to the Standardised specifications are described under VARIATIONS AND ADDITIONS TO STANDARDISED SPECIFICATIONS.

PARTICULAR SPECIFICATIONS

PE: Electrical specifications

PG: Generator specifications

PP: Pumps

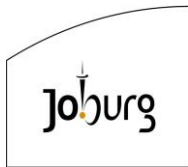
PR: Rehabilitation of concrete structure of existing Water Tower

PS1.2 OTHER APPLICABLE SANS STANDARDS

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

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

Employer:		Contractor:	
Witness:		Witness:	



PS1.3 DISCREPANCIES BETWEEN DIFFERENT SECTIONS OF THE DOCUMENTATION

For the purpose of resolving ambiguities or inconsistencies after award of the tender, the authority of documents shall be:

- a) The General conditions of Contract for Construction Works (2015);
- b) Contract specific data;
- c) Variations to the General Conditions of Contract;
- d) Additional Conditions of Contract;
- e) The Contract Drawings.
- f) The Schedule of Quantities and Rates (the Bill of Quantities);
- g) Project Specifications;
- h) Particular Project Specifications;
- i) Standardized Specifications with variations, additions and omissions;

PS1.4 CERTIFICATE BY RECOGNISED BODIES

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

The Contractor shall be responsible for the supply of all equipment, labour and materials for the Works.

PS1.5 EQUIPMENT, LABOUR AND MATERIALS SUPPLIED BY THE EMPLOYER

The Contractor shall be responsible for the supply of all equipment, labour and materials for the Works.

PS1.6 REQUIREMENTS FOR EQUIPMENT

All equipment and machinery shall be fit for purpose and able to perform the intended work safely and at the production tempos stated in the approved project plan. The Contractor is under obligation to have all lifting equipment as well as all machinery equipped with pressure vessels, regularly tested in terms of the OHS Act and Regulations.

PS1.7 EXISTING SERVICES

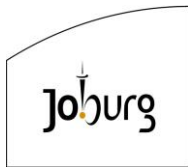
• TREATMENT OF EXISTING SERVICES

The contractor will be required to contact the relevant statutory undertakings, service providers or local authorities to ascertain the location of all services.

• DETECTION EQUIPMENT

No detection equipment is available to determine the depth of existing pipe work prior to the commencement of excavations.

Employer:		Contractor:	
Witness:		Witness:	



- **DAMAGE TO SERVICES**

The contractor shall be liable for all costs incurred in the repair of any known service damaged by his works or machinery. An item has been included in the schedule of quantities in which the contractor is to include all costs that may occur as a result of any of the known services which may require relocation. Such costs are to include for attendance by the service authority's personnel and plant, materials used for the relocation of the service, and possible delays in the construction of the works.

PS1.10 SITE ESTABLISHMENT

- **ADVERTISING RIGHTS**

No advertising by the Contractor will be allowed on site. All advertising rights will vest in the Employer.

- **NOTICE BOARDS**

The contractor will be responsible to supply and erect two Johannesburg Water notice boards at the entrance to the works and close to the main road passing by.

- **SOURCE OF WATER SUPPLY FOR DOMESTIC AND CONSTRUCTION PURPOSES**

The Contractor is responsible for any temporary connection required, whether on site or elsewhere and shall pay all installation and consumption charges. He shall also be responsible for transporting the water from the connection point to the point of use on the site. Johannesburg Water is the water supply authority in the area.

- **SOURCE OF POWER SUPPLY**

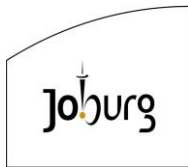
Application must be made to CITY POWER for a temporary power supply to the site. The Contractor will have to apply for a temporary connection for construction purposes, the cost of which will be for his account. All power used for construction purposes as well as the safe onsite distribution will be for the Contractor's account. The tender will be held to include for all such costs and charges.

- **CONTRACTOR'S CAMP AND DEPOT**

The contractor shall provide all his office accommodation and all associated facilities required for the adequate supervision, control and execution of the works. The contractor may use the site to establish his camp, offices and precast facilities subject to approval by the employer and the local municipal authority. However, should the contractor be required to move his camp during the contract period, the cost will be deemed to have been included in the tender rates. The contractor must not cut down or damage any trees or make any excavation without the written permission of the engineer.

The area occupied shall be neatly fenced off to denote its limit. The provision of security for the contractor's site establishment and activities for the duration of the contract shall be his own responsibility and no claims for additional security measures taken during the currency of the contract will be considered.

Employer:		Contractor:	
Witness:		Witness:	



All buildings, latrines etc. shall be in accordance with the local authority and state health regulations, and shall be kept in a clean and sanitary condition to the satisfaction of the engineer. The contractor shall be responsible for the proper upkeep and control of the area for the duration of the contract and all structures and buildings shall be kept in good repair.

The contractor shall provide screened latrines as necessary for his employees, including local labour, the siting of which shall be to the satisfaction of the engineer. They shall be constructed and maintained by the contractor to the satisfaction of the engineer and in accordance with the requirements of government, provincial and/or local authority. All applicable fees and charges due under any health by-law or any or all of the above authorities shall be paid by the contractor.

Chemical toilets, or where possible, flush units shall be used and these shall be kept in a thoroughly clean and sanitary condition. Chemical toilets shall be serviced at least once a week. There is no municipal sewerage service available and flush units may only be used if connected to a regularly serviced conservancy tank. The effluent may only be discharged at a municipal waste water treatment plant.

A separate latrine shall be provided at the site camp for the sole use of the engineer and the engineer's representative and shall meet all of the requirements described above.

All these facilities shall be provided within 14 days of the engineer's instruction to commence with execution of the the works and the contractor shall strictly enforce their use.

On completion of the works and removal of the depot, the site shall be cleaned and restored to its natural condition immediately when it is vacated.

- **DISPOSAL OF REFUSE**

The contractor shall be responsible for disposal of refuse and waste generated by his staff on a daily basis. The site is to be kept clean, neat and tidy, to the employer's satisfaction. The contractor shall locate nearest solid waste disposal site at his own cost for the disposal of refuse. The permission of the waste site operator has to be obtained prior to any material being spoiled on this site. The contractor is responsible for all costs relating to disposal of material at any refuse site.

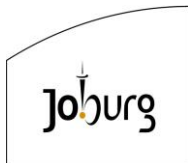
- **TELEPHONE**

This facility will be required and the Contractor is to make his own arrangements in this regard.

- **HOUSING FACILITIES**

The Contractor will not be required to provide housing facilities for the Engineer's staff. Accommodation for the Contractor's employees will not be permitted on site.

Employer:		Contractor:	
Witness:		Witness:	



- **PARKING FACILITIES**

A single 3m x 6m shade cloth covered parking bay will be required for the Engineer.

- **TEMPORARY OFFICES**

Site facilities in the form of a 20m² office with a window, lockable door and air-conditioning will be required for the Engineer. It must be provided with two 15A double plug points, 2X1.2m fluorescent lights, plan table 1.8mX1m, desk with 3 drawers and 2 chairs. Survey assistants and the use of survey and measuring equipment will be required.

- **LABORATORIES AND STORES**

None will be required by the Engineer.

- **SITE USAGE**

- **WORKS AREA**

The Contractor shall ensure that all the works, temporary works, plant, equipment, stores and personnel are confined to the limits of the site as defined in Clause 2.0.1.29 in the General Conditions of Contract, and no encroachment onto private property shall be permitted without the owner's written consent.

Should any encroachment or damage occur, the Contractor shall immediately remove such encroachment or repair such damage, at his own expense, to the satisfaction of the Engineer and/or the Employer.

- **WORKING SPACE**

In certain cases working space may be limited. The method of construction in these restricted areas will depend largely on the Contractor's plant. However, the Contractor must note that measurement and payment will be according to the specified cross-sections and dimensions irrespective of the method used to achieve these cross-sections and dimensions, and that the rates and prices tendered shall be deemed to include full compensation for any difficulty encountered while working in poor ground conditions and that no extra payment will be made, nor will any claim for payment due to these difficulties be considered.

The Contractor will not be allowed to transgress onto adjacent private property without the express approval of both the land owner and the Engineer. All adjoining properties will be inspected by the Contractor, the Engineer and the respective land owners, prior to the commencement of the Works.

- **PERMITS AND WAYLEAVES**

The Contractor is to ensure that all wayleaves required by the applicable authorities are in place, prior to the commencement of any construction. The contractor shall further liaise with

Employer:		Contractor:	
Witness:		Witness:	

the local authorities and local property owners to arrange for access to the site and all temporary works.

It is the Contractor's responsibility to obtain final permit and wayleave approval according to applicable procedures and specifications. Permits and wayleave associated costs shall be deemed to have been included in the scheduled rates for excavation and location of existing services.

PS2 MANAGEMENT

PS2.1 APPLICABLE SANS 1921 STANDARDS

The following SANS 1921 Construction and management requirements for works contracts, standards and associated specification data are applicable:

SANS 1921-1 General Engineering and Construction Works

The specification data applicable to the SANS 1921 standards mentioned above are as follows:

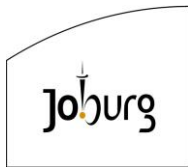
PS2.2 STANDARD: SANS 1921-1

Clause	Specification Data
ESSENTIAL DATA	
4.2.1	The responsibility strategy assigned to the Contractor for the Works is A
4.3	The planning, programme and method statements are to comply with the following: 1. Programme is to show all activities, critical path, approval of documentation after commencement, all long lead items, allow for normal rainfall and Public Holidays. 2. The Contractor is to programme the Works to show all shutdowns for tie-in and temporary bypass purposes and advance warning requirements. 3. The Method Statement provided for the temporary bypass is indicative only of the estimated scope of work. The Contractor is to refine the logic sequencing and task durations to minimise the possible shut down periods.
4.4	The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of the Engineer. To this end, it will be the full responsibility of the Contractor to institute an appropriate Quality Assurance (QA) system on site. The Contractor shall ensure that efficient supervisory staff, the required

Employer:		Contractor:	
Witness:		Witness:	

Clause	Specification Data
	transport, instruments, equipment and tools are available to control the quality of his own workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of the Engineer or the Engineer's Representative to act as foreman or surveyor.
4.12.2	The samples of materials that the Contractor is to provide and deliver to the employer are as stated in the Standard and Project Specifications:
4.12.2	The fabrication drawings that the Contractor is to provide and deliver to the Employer are as stated in the Standard and Project Specifications:
4.14.3	The office accommodation, equipment, accommodation for site meetings and other facilities for use by the Employer and his Agents are: 1) One office as per SABS 1200 A or AB, whichever is referred to in this document, if such facilities are specified in the Bill of Quantities. 2) Safety helmets, gumboots and other necessary safety equipment for the sole use of the Employer and his Agents. 3) Survey equipment as per PSAB 4.2 4) No testing laboratory is required on site for use by the Engineer.
4.14.5	The Employer and his Agents will make use of toilet facilities to be provided by the Contractor for the Engineer as specified in C3.4.6.5 above.
4.17.3	The Contractor will be required to confirm the locations and status of all services irrespective of whether they are shown on the drawings or not. Where public services must be interrupted on account of the Works, it shall be the Contractor's responsibility, in conjunction with the appropriate Authority to ensure that all users affected by the interruption are given due and sufficient notice of the date, time and duration of the interruption.
4.17.4	The requirements for detection apparatus are: NIL
4.17.7	Existing services, which are damaged by the Contractor, shall be repaired by the service provider and all costs of the repair shall be borne by the Contractor.
4.18	The additional Health and Safety requirements of the Employer are as specified in the Health and Safety Specification included in the Particular Specifications.

Employer:		Contractor:	
Witness:		Witness:	



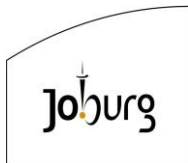
Contract: JW14402
**TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH**



**Volume 1 Tender and Contract
Section C4 Project Specifications**

Clause	Specification Data
VARIATIONS	
4.2,0 o)	Record drawings are to be provided electronically on CD in AutoCAD format and at least one copy is to be provided on paper.
ADDITIONAL CLAUSES	
4.6 (e)	The Contractor is to ensure that storm water runoff or any groundwater seepage is controlled in terms of the approved Environmental Management Plan.
4.9.5	It will be necessary for the Contractor to liaise closely with the Local Authorities, the Local Community and the Engineer's Representative regarding any disruption of the water or electrical supply or access as a result of his construction activities. The Contractor shall advise all parties in writing at least seven (7) days in advance of any such operation, the time for which the supply will be disrupted and the area that will be affected. Disruption of water supplies to any area shall not exceed eight (8) hours in duration. It is recommended that connections to existing pipework be undertaken during weekends or during night time when the water consumption is at a minimum. The Contractor is to ensure that access is maintained at all times to all parts of the Works. The Contractor is to programme the Works to show all shutdowns for tie-in purposes and advance warning requirements.
4.9.6	The provision of security for the Contractor's site establishment, plant and personnel is the sole responsibility of the Contractor and no claims for payment for additional security measures taken during the currency of the Contract will be entertained.
4.17.8	The Contractor shall so carry out all his operations as not to encroach on, or interfere with, trespass on, or damage adjoining land, buildings, properties, road structures, pipelines, places and things, in the vicinity of the Works, without the written approval of the Engineer.

Employer:		Contractor:	
Witness:		Witness:	



PS2.3 STANDARD: SANS 1921-6

Clause	Specification Data
ADDITIONAL DATA	
4.2.1 a)	A qualified service provider is one that appears on the list of recommended service providers, which is available from all regional offices of the Department of Public Works.

PS2.4 MANAGEMENT MEETINGS

The Contractor and such other persons as may be nominated by the Engineer shall be required to attend monthly site meetings, the date and place for which will be set by the Engineer in consultation with the Employer and Contractor.

PS2.5 REPORTS AND FORMS

The Contractor is expected to submit forms relating to plant, rainfall readings, labour, safety statistics, etc. to the Engineer during the monthly site meetings.

Templates of these forms are available electronically and may be requested from the Engineer.

PS2.6 CONTRACTOR'S SITE AGENT

The Contractor shall appoint a suitably qualified and competent Site Agent who shall be on site on a full time basis and at all times when work is being performed, for the full duration of the Contract.

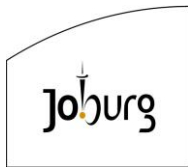
PS2.7 DAILY RECORDS

The Contractor is to provide a Site Diary, which is to be kept on Site, for the purpose of keeping daily records in respect of Work performed on the site, including interruptions w.r.t. plant, labour and materials. Record keeping is to be augmented with date stamped digital photographs.

PS2.8 RECORDING OF WEATHER

The Contractor is to supply and install an accurate rain gauge of modern design and all other necessary equipment within the site camp area, in a position to be confirmed by the Engineer on Site in order to accurately measure rainfall. This area shall be fenced off from the rest of the site camp area and shall have a single pedestrian gate with lock. The Contractor's Site Agent and the Engineer's Representative will have access to the key and will be allowed access to the rain gauge. Rainfall records read at this rain gauge will be kept by the Contractor's Site Agent and the Engineer's Representative. The Engineer's Representative shall use these rainfall records in order to confirm days

Employer:		Contractor:	
Witness:		Witness:	



on which rainfall results in a stoppage of work, critical to the completion of the whole of the Works. The Contractor's tendered rates shall be deemed to include for the supply and installation of the rain gauge, other related equipment, fencing, gate, lock, key, etc.

PS2.9 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 5.12.2 hereof shall be granted by the Employer calculated in accordance with the formula given below for each calendar month or part thereof.

$$V = (N_w - N_n) + ((R_w - R_n)/X)$$

V	Extension of time in calendar days in respect of the calendar month under consideration.
N _w	Actual number of days during the calendar month on which a rainfall of Y mm or more has been recorded.
N _n	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.
R _w	Actual rainfall in mm recorded for the calendar month under consideration.
R _n	Average rainfall in mm for the calendar month as derived from existing rainfall records.

For purposes of the contract N_n, R_n, X and Y shall have those values assigned to them in the Appendix 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 N_n and R_n.

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 (N_w-N_n) shall be considered to represent a fair allowance for variations from the average number of days during which rainfall exceeds Y mm. The factor (R_w-R_n)/X shall be considered to 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:

Employer:		Contractor:	
Witness:		Witness:	

INFORMATION SOURCE: South African Weather Service
 Pretoria, Tel.: 082 233 8484

Y = 10 mm/24 hour day
 X = 20 mm

Table 5.1: Statistical rainfall

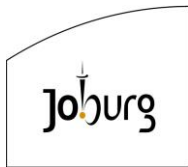
STATISTICAL INFORMATION: JOHANNESBURG BOTANICAL GARDENS: 1985-2006		
Month	RAINFALL	
	Nn = Actual number of days during the calendar months in which a rainfall of more than Y-mm has been received	Rn Average monthly rainfall
January	4.1	116.4
February	3.6	121.3
March	2.6	96.0
April	2.0	30.4
May	0.5	15.2
June	0.1	5.9
July	0.0	1.5
August	0.2	8.7
September	0.3	13.2
October	2.0	66.0
November	3.0	84.5
December	3.8	105.4
TOTAL	21.3	664.6

The Contractor shall be permitted to take his own rainfall measurements on site subject to the Engineer's approval, but access to the measuring gauge(s) shall be under the Engineer'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

PS2.10 SPOIL MATERIAL

No indiscriminate spoiling of material will be allowed. All surplus or unsuitable material shall be spoiled in designated areas as directed by the Engineer on Site, or beyond the boundaries of the Site, as designated by the Contractor at his risk, or at a regional spoil site. The first priority throughout the duration of the Contract shall be to satisfy any fill requirements under this Contract. Material will only be spoiled with the written approval of the Engineer.

Employer:		Contractor:	
Witness:		Witness:	



PS2.11 CO-OPERATION WITH OTHER SERVICE AGENTS AND PUBLIC AUTHORITIES

Other contractors and public authorities may be working on the site during the course of this Contract. The Contractor shall co-operate with these workmen and provide reasonable access to the site to enable them to carry out their work.

If the Contractor is obstructed in any way by such work he shall notify the Engineer within 24 hours, otherwise no claim for delay shall be considered.

PS2.12 COURTESY

In all dealings with the public, the Contractor shall bear in mind their right to enjoy the use of the roads and services and access to their properties. The Employer desires to interfere as little as possible with these rights. At all points of contact with the public, the Contractor and its staff are requested to handle discussions and disputes with deliberate courtesy and understanding.

PS2.13 ACCOMMODATION OF TRAFFIC

Forest Hill Water Tower is located on stand 68, Turffontein at 418 Rifle Range Road (M38). The M38 carries daily very heavy traffic. Coming from the west, there is a sharp bend in the road just before the site. The entrance into the site is directly from the M38. The Contractor will have to put up traffic control measures to slow down the traffic on the M38 as there will be direct interference between road traffic and construction traffic.

Where the Works affect the safety or operation of vehicular and/or pedestrian traffic, the Contractor shall provide, erect and maintain such traffic signs, barricades, warning lights and personnel as are necessary or ordered.

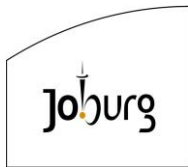
The Contractor shall abide by the guidelines and procedures set out in the Safety at Roadworks in Urban Areas site manual as published by the Department of Transport for the National Transport Commission, 1984.

The Contractor may, with the approval of the Engineer, make arrangements with the occupiers of the affected erven, properties and businesses to close off a portion of a street, road, footpath or entrance temporarily, provided the Contractor duly notifies the occupiers of the intended closure and its probable duration and shall, as punctually as possible, re-open the route at the prescribed time.

The road shall be made safe and re-opened to traffic overnight. Any such closure shall be made by arrangement between the Contractor and the occupiers and shall not absolve the Contractor from his obligations under the Contract to provide access at all times. Barricades, traffic signs and drums shall be provided by the Contractor to suit the specific conditions.

It must be noted that services such as telephone and power poles, stay poles and stay wires and fences may be located within close proximity and within the site. The Contractor

Employer:		Contractor:	
Witness:		Witness:	



will be required to take due care for the protection thereof and will be liable for any damage to these services.

PS2.14 FINISHING AND TIDYING AND SITE MAINTENANCE

During the progress of the Work and upon its completion, the Site of the Works shall be kept and left in a clean and orderly condition. The Contractor shall at all times store materials and equipment for which he is responsible in an orderly manner, and shall keep the site free from debris and obstruction.

Progressive and systematic finishing and tidying will form an essential part of this Contract. On no account must spoil, rubble, materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily impede the activities of others, and in the event of this occurring, the Employer shall have the right to withhold payment for as long as may be necessary in respect of the relevant Works in the areas(s) concerned without thereby prejudicing the rights of others to institute claims against the Contractor on the grounds of unnecessary obstruction.

Finishing and tidying must not be deferred to the end of the Contract. The Works will not be certified as complete, until the whole of the Works including all finishing and tidying, has been fully completed to the satisfaction of the Engineer.

All finishing and tidying shall be carried out to the best advantage of the project as a whole and in the closest co-operation with other Contractors.

PS2.15 LENGTH OF TRENCHES

Unless otherwise permitted in writing by the Engineer, not more than 50m of trench in any one place and not more than 50m of trench in total within the project area shall be opened in advance of pipe laying operations. No trench may be left open over the builders' holidays or on extended long weekends. The cost of backfilling any trenches before the shut-down period and the re-opening thereof after the shut-down period shall be for the Contractor's account.

PS2.16 EXCAVATION OF TRENCHES

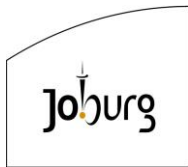
Machine and hand excavation will be permitted after proving of services.

All requirements of the OSH Act shall be complied with, with respect to shoring for both excavation methods.

PS2.17 TESTING AND QUALITY CONTROL

The Contractor shall engage the services of a testing laboratory, to be approved by the Engineer, to carry out all testing of materials and quality control testing as described in the relevant Standardised Specifications, as well as other testing as may be elsewhere described.

Employer:		Contractor:	
Witness:		Witness:	



No separate payment will be made for such testing by an approved laboratory and the costs thereof will be deemed to be included in the Contractor's tendered rates for the various items of work requiring testing in accordance with the specifications.

The results of all such tests including CBR's, UCS's, densities and all other tests as are described in the specifications and at not less than the prescribed frequency, shall be immediately communicated to the Engineer in writing.

The results of such tests by an approved laboratory shall not be regarded as final and binding upon the Engineer, who shall base his decisions relating to the acceptability of the quality of the work, not only on the basis of such tests by an approved laboratory, but also on the results of any such additional tests as he may decide to carry out. The cost of such acceptable control testing shall be to the Employer's account, with the exception of tests on sections which fail to meet the requirements, where the costs of such tests shall be borne by the Contractor.

PS2.18 OPENING UP AND CLOSING DOWN OF BORROW PITS

Only registered local borrow pits may be used.

PS2.19 SURVEY BEACONS

The Contractor shall protect all survey beacons during construction of the Works. The site has been provided with beacons and the Contractor takes full responsibility for the preservation of these beacons.

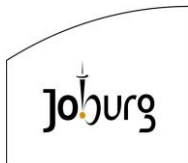
All beacons must be identified and whitewashed before the construction activities commence and the Contractor shall confirm in writing to the Engineer before commencement of construction that all beacons have been proven.

Any beacons not proven must be listed and the list submitted to the Engineer for referral to the Land Surveyor before commencement of any construction activities. The Land Surveyor will verify the existence of these beacons and if proven to exist, will be entitled to recover from the Contractor, if necessary through deductions from the Contractor's payment certificates, any costs incurred. Beacons the Land Surveyor is not able to prove will be reinstated by him in conjunction with the Contractor's construction activities.

Any beacons that have been disturbed or removed during construction will be replaced at the Contractor's expense. When construction has been completed, the Contractor shall identify and whitewash all beacons for inspection by the Engineer before a certificate of practical completion will be issued.

Where proper execution of the Works necessitates the removal of beacons, the Contractor shall give notice to this effect to the Engineer, allowing sufficient time for the listing and relocation, removal or reference marking of such beacons. On completion of construction, before the Practical Completion Certificate is issued, the Contractor shall expose and whitewash the reference pegs relating to the beacons that were listed and removed or disturbed and arrange for the beacons to be replaced by a Land Surveyor. Only when the

Employer:		Contractor:	
Witness:		Witness:	

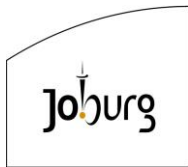


Engineer is satisfied that the removal of beacons had been imperative, will payment for the replacement of beacons not be at the Contractor's expense.

PS2.20 OCCUPATIONAL HEALTH AND SAFETY ACT NO. 85 OF 1993 AND REGULATIONS

The Contractor shall comply with the requirements of the Occupational Health and Safety Act and the Regulations as well as the safety specification bound into this document. The Contractor shall enter into an agreement with the Employer in the form set out elsewhere in this document.

Employer:		Contractor:	
Witness:		Witness:	



B. STANDARD SPECIFICATIONS

The standard specifications on which this contract is based are the South African Bureau of Standard Standardized Specifications for Civil Engineering Construction SABS 1200, also now referred to as SANS 1200.

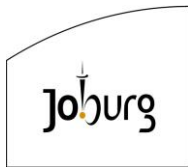
Although not bound in, nor issued with this document, the following sections of the Standardized Specifications of SANS 1200 shall form part of this document.

SABS 1200	A	General
SABS 1200	AB	Engineer's office
SABS 1200	C	Site Clearance
SABS 1200	DA	Earthworks (small works)
SABS 1200	DB	Earthworks (pipe trenches)
SABS 1200	DM	Earthworks (roads, subgrade)
SABS 1200	G	Concrete (structural)
SABS 1200	HA	Structural steelwork (small works)
SABS 1200	HC	Corrosion protection of structural steelwork
SABS 1200	L	Medium pressure pipeline
SABS 1200	LB	Bedding (pipes)
SABS 1200	LD	Sewers
SABS 1200	LE	Stormwater drainage
SABS 1200	ME	Subbase
SABS 1200	MF	Base
SABS 1200	MJ	Segmented paving
SABS 1200	MK	Kerbing and channeling

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

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

Employer:		Contractor:	
Witness:		Witness:	



C. VARIATIONS AND ADDITIONS TO THE STANDARDIZED SPECIFICATIONS AND PARTICULAR ADDITIONAL SPECIFICATIONS

The following variations and additions to the SABS 1200 Standardized Specifications apply to this Tender. An amendment to SABS 1200 is indicated by the prefix “PS”. The letters and numbers following these prefixes respectively indicate the relevant specification and clause in SABS 1200 to which it applies.

PSA GENERAL (SABS 1200A - 1986)

PSA 3 MATERIALS

PSA 3.1 QUALITY

Add the following:

All material used in the Works shall be new and no second or previously used material shall be allowed. All material shall, where such mark has been awarded for a specific type of material, bear the SABS mark. Alternatively, the Contractor shall furnish the Engineer with Certificates of Compliance of materials, which bear the official mark of the appropriate standard.

Add the following sub clauses:

PSA 3.3 SUPPLY OF MATERIALS

The contractor will be responsible to supply all the materials necessary for the proper execution of the works. The contractor shall also be fully responsible for quality of materials used and/or installed.

The quantities of material set out in the Schedule of Quantities were determined with the best intention of providing the most accurate amounts as possible from the calculations, design drawings and documentation. These quantities must be considered as approximate quantities only and the Contractor must verify the Quantities from site measurements prior to ordering the material. No liability will be attached to the Employer or his representatives in respect of materials ordered incorrectly from the amounts or the specifications as stated in the Schedule of Quantities.

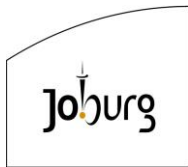
PSA 5 CONSTRUCTION

PSA 5.1 SURVEY

Add the following:

The contractor must note that a limited amount of survey control points have been established. The Contractor will be required to verify the accuracy of such and shall be held responsible for any errors in the setting out of the works which may arise from the usage of this survey control.

Employer:		Contractor:	
Witness:		Witness:	



PSA 5.2 WATCHING, BARRICATING, LIGHTING AND TRAFFIC CROSSING

Add the following:

TEMPORARY TRAFFIC SIGNS

The Contractor shall provide, erect and maintain on the site and at such positions on the approaches to the site all traffic signs necessary for the direction and control of traffic.

The details of all such signs, which shall conform to the current Road Traffic Ordinance and the departmental publication entitled "Safety in Road Construction", must be approved by the Engineer before erection.

The signs shall be reflectorised or adequate; illuminated at night in a manner approved by the Engineer and kept clean and legible at all times. The Contractor shall reposition, cover or remove signs as required during the progress of the works.

PSA 6.2 DEGREE OF ACCURACY (SUB CLAUSE 6.2)

Degree of accuracy II will apply to all work on this project, except on the tower columns, beams and tank wall where a degree of accuracy I will apply.

PSA 7 TESTING (SUB CLAUSE 7)

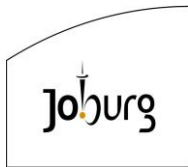
The onus rests on the Contractor to produce work, which conforms in quality and accuracy of the detail to the requirements of the Specifications and Drawings and the Contractor must at his own expense, institute a quality control system and will provide experienced Engineers, foremen, surveyors, material technicians and other technical staff, together with all the instruments and equipment, to ensure adequate supervision and positive control on works.

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

The Contactor's attention is drawn to the provisions of the various sections of the Specifications regarding the minimum frequency of the testing that will be required for process control. The Contactor shall at his own discretion increase the frequency where necessary to ensure adequate control.

The Contactor shall submit to the Engineer the results of all relevant tests, measurements and levels indicating compliance with the specifications on completion of every part of the work for examination.

Employer:		Contractor:	
Witness:		Witness:	



Should the results of any of these tests fall below the required standards as specified in the specifications, the cost of any additional tests required by the Engineer will be to the account of the Contractor.

PSA 7.2 LABORATORY (SUB CLAUSE 5.2)

A laboratory for the use of the Engineer's representative is not required on site. A commercial laboratory approved by the Engineer and appointed by the Contractor shall do all acceptance control tests required in terms of the Contract. All tests must be done according to the tests prescribed in the SABS 1200 under the relevant sections.

PSA 8 MEASUREMENT AND PAYMENT

PSA 8.2.2 TIME RELATED ITEMS

Add the following:

An extension of time granted will not necessarily or automatically entitle the Contractor to additional payments of time related items. Additional payments for specific time related items after the granting of an extension of time must be motivated and substantiated by the Contractor and shall be subject to approval by the Engineer.

PSAB ENGINEER'S OFFICE (SABS 1200AB)

PSAB 3.1 NAMEBOARDS

The nameboards shall be according to Joburg Water's standard nameboard detail. No other name boards other than stated above shall be allowed. On completion of the works, the Contractor shall obliterate all particulars on the name board and remove the board from the site, prior to the release of retention money.

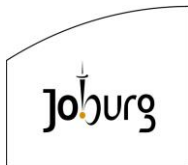
PSAB 3.2 OFFICE BUILDING

The Contractor shall provide and furnish an office for exclusive use by the Engineer and his representative, as well as a dedicated toilet for use by the Engineer's staff, as described in SABS 1200 AB clause 3.2

In addition to the standard requirements:

- a) The location of the office unit shall be selected in consultation with the Employer's Agent.
- b) The Employer's Agent must approve all internal furniture.
- c) Carport's shall be provided and shall cover not less than 24 m², with the ground surface consisting of a layer of crushed gravel (no larger than 9 mm) to combat dust and mud. The carport shall be easily accessible, and be such that

Employer:		Contractor:	
Witness:		Witness:	



cars are protected from direct sunlight all times of day, and against inclement weather.

- d) Electrical power from the local authority that is adequate for operating a computer, an air conditioning unit, a heater and a refrigerator.
- e) The Contractor shall, in addition to his facilities, further provide at the site camp a meeting room for the Employer's Agent. The meeting room shall have adequate seating and table to hold site and other meetings, for 15 people.

PSAB 4 EQUIPMENT

PSAB 4.1 TELEPHONE

Add the following:

A telephone will not be required for the sole use of the Employer's Agent. However, the Contractor shall be responsible for the payment of calls related to the contract made by the Employer's Agent's Representative, on his own mobile phone, during the course of the contract.

Add the following:

PSAB 4.2 COMPUTER FACILITIES

The Contractor shall, for the duration of the Contract, provide the computer equipment complete with printer, and internet connection (5G) together with the software specified hereunder, for the exclusive use of the Employer's Agent and his staff:

- a) 1 laptop
- b) 1 A3 colour laser printer with scanning facility

The laptop shall comply with the following minimum specifications:

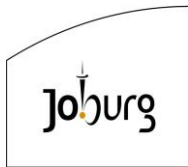
- ☐ Intel Core i7 5.0 Ghz CPU with 12Mb Cache
- ☐ 16Gb ddr4 RAM
- ☐ 1 Tb SSD hard drive
- ☐ Usb keyboard
- ☐ Usb optical mouse
- ☐ 17" FHD anty glare display
- ☐ 3x USB, HDMI, Bluetooth and LAN connections/ports
- ☐ Windows 11 professional, MS Office and MS Projects pre-installed

Printer to be able to scan, and print both A4 and A3 documents , in monochrome and colour

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

The following software shall be properly installed on the computer, and the original license agreements and disks shall be provided to the Employer's Agent for safekeeping:

Employer:		Contractor:	
Witness:		Witness:	



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- ☐ MS Windows Latest Edition
- ☐ MS Office Home and Business Latest Edition
- ☐ MS Projects Latest Edition

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 of notification by the Employer's Agent's staff.

The Contractor shall further provide at his own cost, all paper, ink cartridges and other consumables reasonably required by the Employer's Agent.

PSC SITE CLEARANCE (SABS 1200C)

PSC 1 SCOPE

Add the following:

"Where labour intensive construction methods are applied, the maximum boulder size for removal under this specification will be 50kg. Boulders between 50kg and 0.15 m³ (i.e. 21pprox. 450kg) will be deemed to be removable by other methods under this specification.

PSC 3 MATERIALS

PSC 3.1 DISPOSAL OF MATERIAL

Add the following:

"Materials arising from clearing and grubbing shall be disposed of as maybe ordered by the Engineer. Trees and stumps necessarily removed shall not be burnt unless authorised by the Engineer, but shall be cut and stacked at areas designated by the Engineer.

The Contractor shall locate and obtain his own dumping site for the disposal of material. The Contractor shall comply with the requirements of any by-law, statute, ordinance, regulation and local authority requirements. The Employer will not accept any responsibility or liability in this regard.

No overhaul will be payable on the disposal of material arising from "clearing and grubbing".

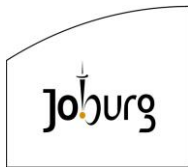
PSC 5 CONSTRUCTION

Add the following:

"Where labour intensive methods are applied, the Contractor shall be expected to adhere to the following:

- Hand tools shall be utilized.

Employer:		Contractor:	
Witness:		Witness:	



- The use of motorised vehicles (trucks, etc) will only be permitted in cases where the distance of the cleared material is to be transported further than 150m. Provided always that such material must be loaded and off-loaded by labour.
- The use of pneumatic hand held breaking equipment will be allowed to break down hard material to an acceptable size suitable for labour intensive construction methods”

PSC 5.1

Add the following:

“The areas to be cleared and grubbed will be indicated by the Engineer. Should a portion or the whole of the site have been cleared and grubbed by nature or by others prior to the start of construction, then no clearing and grubbing will be ordered or payment made with respect to the applicable portion of the site.

Where not specifically stated, pipeline routes shall be cleared to a distance of 1.5m on both sides of the pipeline centre line. Route markers or bench marks may not be disturbed by these actions”.

PSC 5.2.3 PRESERVATION OF TREES

Add the following:

“The penalty in respect of every individual tree and shrub designated as a tree or shrub to be preserved that is damaged or removed unnecessarily by the Contractor, shall be R1 000. Trees that fall within areas upon which the Works are to be constructed or within areas that the Contractor must occupy for the proper construction of the Works will not be designated for preservation.

PSD EARTHWORKS (SABS 1200D)

PSD 5 CONSTRUCTION

PSD 5.1.2 EXISTING SERVICES

Known existing services are shown on the Drawings. The Contractor shall, however, continually be on the lookout for the unknown services and he shall immediately notify the Engineer if such a service should be located.

If the existing services are not shown on the drawings but the existence thereof can be reasonably expected, the Contractor shall, in conjunction with all the relevant authorities, determine the exact depth and location of such services before the commencement of construction. After locating the exact position of services and the Contractor shall be liable for all costs and the subsequent costs arising from the damage thereof as a result of the contractor’s activities. The Contractor must also indicate these services in the “As Built” drawings.

Employer:		Contractor:	
Witness:		Witness:	

All existing services where new connections are proposed must be located and opened by the hand excavation for inspection by the Engineer before commencing trench excavation. Any costs or losses suffered by the Contractor as a result of not abiding by this specification will be for the Contractor's account.

5.2.3.2 BACKFILLING OF TRENCHES AND BACKFILLING OR FILLING AGAINST STRUCTURES

Add the following to D 5.2.3.2:

Excavated material which is suitable for backfilling shall be stockpiled whilst all other materials from excavations shall be disposed off site. Backfilling to structures and embankments shall comply with the requirements indicated on the drawings and shall be compacted to 93% and 95% modified AASHTO density respectively.

Contractors are to note that no overhaul of backfill material will be measured and backfill quantities will only be measured up to the pay lines as indicated on the drawings. The Contractor shall be responsible for backfilling any working space and excavation slopes, over breaking, batter etc, beyond the indicated pay lines.

No backfilling behind the reservoir will be allowed until the hydraulic test has been completed.

PSDB 5 CONSTRUCTION

PSDB 5.1 PRECAUTIONS

PSDB 5.1.1 GENERAL

Add the following to this sub-clause:

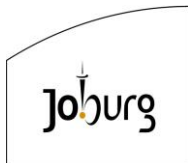
The Contractor shall programme his activities in such a way that long sections of trenches do not lie open for undue periods of time, as this poses a safety risk. The pipes shall be laid as soon as possible after excavation of the trenches and the trenches then backfilled. Under no circumstances will trenches be left open for more than 1 week.

The Contractor shall inform the Johannesburg Road Agency (JRA) at least 2 days in advance of the actual date on which he proposes to excavate in any road or footway.

PSDB 5.1.4 EXISTING SERVICES THAT INTERSECT OR ADJOIN TRENCHES

Add the following to this sub-clause:

Employer:		Contractor:	
Witness:		Witness:	



Where it is necessary for a pipeline to pass under existing drains, the Contractor shall carefully excavate and backfill around them. During the course of the work, the drains shall be adequately supported to the satisfaction of the Engineer. Any damage shall be reported without delay and shall be made good by the Contractor before backfilling.

PSDB 5.4 EXCAVATION

Add the following to this sub-clause:

Where the pipe trench crosses surfaced roads the Contractor shall neatly cut four parallel grooves into and through the "black top" before excavating between the inside 2 grooves. The outside 2 grooves should be 100 from the inside ones. The cost of this operation, where not scheduled separately, will be deemed to have been included in the general rates for excavation.

PSDB 5.5 TRENCH BOTTOM

Add the following to this sub-clause:

In waterlogged conditions and/or where so instructed by the Engineer, a 100mm thick layer of 20mm to 6mm graded stone shall be laid under the pipes.

PSDB 5.6 BACKFILLING

PSDB 5.6.1 GENERAL

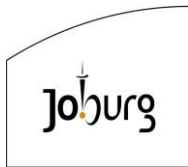
Add the following to this sub-clause:

Notwithstanding the requirements of sub-clauses PSDB 5.6.1 and 5.6.6, no pipe joint or pipe-fitting shall be covered by either the blanket or the backfill prior to the successful completion of the visual inspection and the pressure testing of the relevant section of the pipeline and without the written permission of the Engineer.

PSDB 5.6.2 MATERIAL FOR BACKFILLING

Add the following to this sub-clause:

Employer:		Contractor:	
Witness:		Witness:	



No backfilling may be done unless it is authorised by the Engineer. Trenches must be backfilled and compacted to 90% modified AASHTO to at least 300mm above the pipe soffit in layers of 150mm around and above the pipe and care should be exercised to prevent damage to the pipe. Subsequent layers may be compacted in 175mm layers. Except where backfill material is in the opinion of the Engineer moist enough, water must be added to facilitate compaction.

In the event of no suitable material being available around the pipe for backfilling the trench in question, the Contractor must obtain suitable material from other excavations, transport it to the site and remove the unsuitable material to an approved dumping site. If no suitable material is thus obtainable, the Contractor must sift the material obtained from the trench through a sieve with a 10mm mesh, but, if above mentioned procedure is not practical, the Engineer may instruct the Contractor to import suitable material from approved sources and the Contractor will be under obligation to remove the unsuitable material to a dumping site.

If any settlement occurs during the Construction Period or before the end of the defects liability period, the Contractor must rectify such settlement to the satisfaction of the Engineer.

After all the excavations and backfilling have been completed, the surplus material and all additional material must be removed from the site to the satisfaction of the Engineer.

PSDB 5.6.3 DISPOSAL OF SOFT EXCAVATION MATERIAL

Add the following to this sub-clause:

Surplus material or unsuitable material which is not disposed of within the trench servitude shall, on the instruction of the Engineer, be disposed of at approved tipping sites to be located by the Contractor.

The prior approval of the Engineer must be obtained before surplus material may be deposited, spread and levelled at agreed sites within the area of the works.

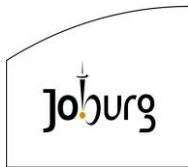
PSDB 5.6.4 DISPOSAL OF INTERMEDIATE AND HARD ROCK MATERIAL

Add the following to this sub-clause:

Surplus intermediate and hard rock material from trench excavations shall, on the instruction of the Engineer, be disposed of at approved tipping sites to be located by the Contractor.

The prior approval of the Engineer must be obtained before surplus material may be deposited, spread and levelled at agreed sites within the area of the works.

Employer:		Contractor:	
Witness:		Witness:	



PSDB 5.6.5 DEFICIENCY OF BACKFILL MATERIAL

Add the following to this sub-clause:

All haul distances shall be freehaul distances.

PSDB 5.7 COMPACTION

PSDB 5.7.2 AREAS SUBJECT TO TRAFFIC LOADS

Add the following to this sub-clause:

In areas subject to traffic loading and in constructed footways compaction shall be done as directed by the Engineer or JRA specifications.

PSG CONCRETE STRUCTURAL (SABS 1200 G)

PSG 2 INTERPRETATIONS

PSG 2.1 SUPPORTING SPECIFICATIONS

Add the following:

SABS 1491 Part 1	:	Ground granulated blast furnace slag (GGBS)
SABC 1491 Part 11	:	Pulverised Fly Ash (PFA)
SABC 1491 Part 111	:	Condensed Silica Fume (CSF)

PSG 3 MATERIALS

PSG 3.1 APPROVAL OF MATERIALS

Add the following:

If during the progress of the work, the contractor desires to use materials of proportions other than those originally approved, or if in the opinion of the Engineer or his representative, the materials from the sources originally approved change in characteristics, he shall provide evidence satisfactory to the Engineer that the new materials and/or new combination of materials will produce concrete meeting the requirements of the specification and will not bring about unacceptable changes in the appearance or other characteristics of the structure.

When any changes are made in terms of this sub clause, they shall be made at the contractor's expense, and no extra payment will be allowed by reason of such change.

Employer:		Contractor:	
Witness:		Witness:	

PSG 3.2 CEMENT

PSG 3.2.1 APPLICABLE SPECIFICATIONS

Add the following:

Ground granulated blast furnace slag (GGBS) used on the Works shall be from a source to be approved by the Engineer and shall comply with the requirements of SABS 1491 Part 1, as amended.

Pulverised Fly Ash (PFA) used on the works shall be from a source to be approved by the Engineer and shall comply with the requirements of SABS 1491 Part 11, as amended.

Condensed Silica Fume (CSF) used on the Works shall be from a source to be approved by the Engineer and shall comply with the requirements of SABS 1491 Part 11, as amended.

Cement types to be used under certain specific conditions of environment or geographic location are given in Table 1 – “selection of cement type”. A minimum amount of 375 kg/m³ and a maximum amount of 450kg/m³ of cementitious material will be required in the concrete irrespective of the type of cement used.

Table 1 – Selection of cement type

Location of Structure	Temperature of concrete	Type of Cement
	< 20°C	CEM11 A – S 42.5 CEM11 B – S 42.5 CEM11 A – M42.5
	20°C – 30°C	CEM11 A – S 42.5 CEM11 B – S 42.5 CEM11 A – M42.5 CEM11 A – V (or W) 32.5 CEM11 B – V (or W) 32.5
	>30°C	CEM11 A – S 42.5* CEM11 B – S 42.5* CEM11 A – M42.5* CEM11 A – V (or W) 32.5 CEM11 B – V (or W) 32.5

PSG 3.2.3 STORAGE OF CEMENT

No cement shall be stored on the site for a longer period than 28 days. After this period the Engineer may call for tests to be carried out in accordance with SABS 471, 831 or 626 and if the cement complies it may be used. Lumpy cement, broken pockets and sweepings shall not be used. The cement sacks shall be closely stocked, not more than 12 sacks high, and shall not be stacked against the walls. The arrangements of stacking shall be such as to facilitate the cement being used in the same order in which it is received.

Employer:		Contractor:	
Witness:		Witness:	

PSG 3.3 WATER

Add the following:

Water shall be obtained from the city water supply where possible and shall be taken from any other source only on the approval of the Engineer. Where there is reason to suspect the presence of harmful impurities, the Engineer may require the contractor to submit the results of approved tests.

PSG 3.4 AGGREGATES

PSG 3.4.1 APPLICABLE SPECIFICATION

Replace the entire contents of the clause with the following:

Grading of fine aggregate: The grading of fine aggregate must comply with the requirements of Table 2 – “Grading of fine aggregate”. It should be noted that it is unlikely that a single sand with this grading will be available in the region under the control of Johannesburg Water and that two or more sands will have to be blended.

Table 2 – Grading of fine aggregate

Sieve Size	Percentage Passing
4 750 µm	90 - 100
2 360 µm	75 - 100
1 180 µm	60 - 90
600 µm	40 - 60
300 µm	20 - 35
150 µm	5 - 12
75 µm	0 - 5
FM	2.03 – 3.00

Grading of coarse aggregate: Coarse aggregate in structural concrete will have a maximum nominal size of 26.5mm as specified in SABS 1083 with due cognisance of the spacing of the reinforcing bars.

Water demand of sand: Sand with a water requirement in excess of 200L /m³ when made up into concrete with the intended mix proportions (including admixtures, if any) will not be allowed.

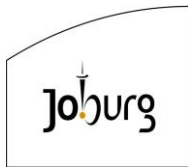
PSG 3.5 ADMIXTURES

PSG3.5.1 APPROVAL OF ADMIXTURES REQUIRED

Add the following:

For waterproofing and durability of the concrete, Penetron Admix crystalline water proofing additive with tracing agent shall be used. Minimum dosage shall be of 0,8% by weight of cementitious content in the concrete mix and shall carry a 20 year

Employer:		Contractor:	
Witness:		Witness:	



warranty. Penetron shall be added and used strictly according to the manufacturer's specifications.

Other admixtures in the design of concrete mixes to modify the properties of the plastic concrete, may only be used with the approval of the Engineer. The use of admixtures, which have a retarding effect on the rate of hydration of the cement, may not be used when the concrete temperatures are below 20° C. When the concrete temperature exceeds 30° C, the use of retarding admixtures will be mandatory with cements that have a strength class 42.5R or 42.5. Admixtures containing chlorides shall not be used.

PSG 4 PLANT

PSG 4.1 GENERAL

Add the following:

When considered necessary by the Engineer, stand-by equipment shall be available at short notice.

PSG 4.2 BATCHING PLANT

Add the following:

The site batching of concrete shall be carried out by mass batching only.

PSG 4.3 MIXING PLANT

PSG 4.3.1 GENERAL REQUIREMENTS FOR MIXING PLANT

Add the following:

When considered necessary by the Engineer, a spare mixer shall be held in readiness to run on 15 minutes notice in case of breakdown of the mixer.

PSG 4.5 FORMWORK

PSG 4.5.1 DESIGN

Add the following:

The design of the formwork and supports shall be the responsibility of the Contractor and shall be designed and detailed by a registered Professional Engineer, if required by the special conditions of contract, and submitted for approval by the Engineer. All joints shall be either horizontal or vertical. Chamfer strips shall be provided on all exposed edges.

The design of all proposed formwork shall be subject to the approval of the Engineer. Such approval shall in no way relieve the Contractor of his responsibility under the contract.

Employer:		Contractor:	
Witness:		Witness:	

PSG 4.5.3 TIES

Add the following:

The ends of any embedded ties shall have cover equal to that required for reinforcement. The gap left from the end of the tie to the face of the concrete shall be effectively sealed on both sides of the structure to ensure water tightness.

PSG 5 CONSTRUCTION

PSG 5.1 REINFORCMENT

PSG 5.2,0 BENDING

PSG 5.2,0.4 Add the following:

All welding of mild steel, where permitted, shall be in accordance with BS 5135.

PSG 5.1.2 FIXING

Add the following:

All reinforcement placed in structures within 5km of the sea should be washed with clean, fresh water after placement in the formwork and not longer than 24hrs prior to the casting of concrete.

The placing of bars on fresh layers of concrete, as work progresses will not be permitted. No concrete shall be placed until the Engineer or his representative has stated that he is satisfied that the reinforcement is correctly positioned as shown on the drawings.

PSG 5.1.3 COVER

Replace clause 5.1.3 with the following:

All concrete cover blocks used shall be of semi-spherical shape. The concrete cover blocks used shall have the same characteristic 28-day compressive strength as that specified for the respective structural concrete elements. The reinforcing tie wire used in the manufacture of the cover blocks shall be hot dip galvanised. A minimum cover of 30mm must be maintained between the reinforcing tie wire and the conical end of the block.

The minimum clear cover to concrete over all reinforcement shall be as indicated in the following Table 3 unless otherwise specified on the drawings. Correct cover shall be maintained by concrete spacers whose strength is not less than that of the concrete specified. Suitable plastic spacers are permitted if approved by the Engineer.

Type of Construction	Min Cover mm
1. Slabs and Walls	

Employer:		Contractor:	
Witness:		Witness:	

a) Plastered and unplastered internal work	The greater of 20 or d
b) Exposed to water pressure	40
c) External walls	40
2. Columns	The greater for 40 or d
3. Beams	
a) End cover beyond hooks	The greater of 40 or 2d
b) All other surfaces	The greater of 40 or d
4. Piles	
a) Precast piles and on faces poured against formwork	40
b) On unformed faces poured against ground	75
5. All structures in sea water or in marine atmosphere	50
6. Structures in contact with backfilling or corrosive atmosphere	40
7. Footings	
a) Members cast on a blinding layer	50
b) Members cast in contact with the ground	75

Note: In the above table “d” refers to the largest reinforcing bar diameter.

PSG 5.5.16 BLINDING CONCRETE:

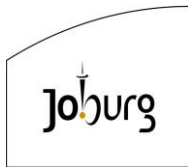
Binding concrete shall be measured per square metre and shall include for a steel trowel finish true to falls.

PSG 5.2 FORMWORK

The surface of the blinding layer, the floor, the internal upper surface of the all footings and the upper surface of the roof end the slabs over the valve chamber shall be finished in accordance with clause PSG 5.2.1 class 4 – steel Float Finish.

The internal surfaces of all walls, columns and the underside of the roof and all exposed surfaces shall be finished in accordance with clause PSG 5.2.1 class 3a – Smooth Finish.

Employer:		Contractor:	
Witness:		Witness:	



All surfaces in contact with backfill material may be finished in accordance with clause PSG 5.2.1 class 1 – Ordinary Surface Finish.

PSG 5.2.1 CLASSIFICATION OF FINISHES

Replace the entire Clause with the following:

Surface finishes to formed concrete faces shall be classified as hereunder –

Class 1: ordinary finish;

Class 2: rubbed finish;

Class 3: off the form finishes;

- (a) Smooth finishes,
- (b) Board marked finishes,
- (c) Special patterned finishes.

Class 4: exposed aggregate finishes;

- (a) brushed en washed finishes,
- (b) Tooled finishes,
- (c) Sand blasted finish,
- (d) Aggregate transfer finishes.

Class 5: applied finishes:

- (a) Rendered finishes,
- (b) Painted finishes.

Class 1 – Ordinary Surface Finish

This is the finish left on a concrete surface after the removal of the forms and the filling of all holes left by shuttering bolts en the repairs of all defects. The surface shall be true end even, free from stone pockets, depressions and projections.

Class 2 – Rubbed Finish

Immediately after removal of the shuttering all defects shall be made good and the rubbed finish shall be applied within three days as follows:

Before starting this work the concrete shall be kept thoroughly saturated with water for a minimum period of 3 hours. Sufficient time shall have elapsed before the wetting down to allow the mortar used in the pointing of the bolt holes and defects to set properly. Surfaces to be finished shall be rubbed with a medium coarse carborundum stone, using a small amount of mortar on its face. The mortar shall consist of cement and fine sand mixed in the proportions used in the concrete being finished. Rubbing shall be continued until all projections and irregularities have been removed, all voids filled and a uniform surface has been obtained. The paste produced by this rubbing

Employer:		Contractor:	
Witness:		Witness:	

shall be left in place for at least five days. The surface shall be smoothed by being rubbed lightly with a fine carborundum stone.

Class 3 – Off the Form Finishes

Off the form finishes require a very high standard in concrete quality, formwork and technique. The intention is that no after treatment other than treatment of bolt-holes (which should be placed with regulatory and precision) should be required. Forms shall be unblemished and panels regular. Joints shall be a feature of the pattern and shall be handled with care. Reinforcement cover blocks shall be of semi-spherical shape to minimise their appearance on the finished surface.

- (a) Smooth finishes may be obtained from non-absorptive linings to forms, form plywood, shutter board, or plastic faced board in new condition.
- (b) Boardmarked finishes shall be obtained from the use of timber planks, which shall be dressed and thickened unless otherwise specified. When unplanned timber is specified, boards with a strong grain shall be mixed with boards with a less pronounced grain and not grouped together. The Engineer shall indicate if all boards are not to be horizontal and a patterned panel effect is required.
- (c) Special patterned finishes are required to reflect without blemish the surface of patterned hardboard, rubber, thermoplastic or other lining as specified.

Class 4 – Exposed Aggregate Finishes

The purpose of these finishes is to relieve the uniform colour and texture of the concrete by exposing the aggregate, which shall be normal size concrete aggregate except where otherwise specified. Attention is directed to the necessity for allowing for the material to be removed and ensuring that the requisite cover to reinforcement is maintained.

- (a) Brushed and washed finishes are obtained by stripping and scrubbing the concrete surface with a stiff wire brush. Unless forms can be stripped at a very early age (approximately 16 hours as 20°C) this method cannot be used unless the formwork has been treated with a retarding agent. Care shall be taken to ensure that concrete is not deposited against the face of treated forms, which should be stripped as early as possible. Where scrubbing with water is not effective, a solution of hydrochloric acid in the proportion of 1 part of acid to 4 parts of water shall be thoroughly and evenly scrubbed into the surface until the desired texture is obtained. The complete surface shall then be neutralised by washing thoroughly with water to which a small amount of ammonia has been added. When acid is used, special precautions shall be taken to protect workmen, underlying materials and persons passing.
- (b) Tooled finishes may be carried out by the use of bush-hammers, light mechanical chisels or other approved tools, preferably mechanically operated. No tooling shall be done until the concrete has attained an age of at least 14 days after casting when normal Portland cement has been used and 7 days when rapid hardening

Employer:		Contractor:	
Witness:		Witness:	

cement has been used, or longer as may be necessary to prevent the aggregate particles from being dislodged.

The final finish shall show a surface of evenly distributed coarse aggregate particles set in a matrix of mortar, each aggregate particle being in slight relief. After the tooling has been completed, the surface so treated shall be scrubbed down with a stiff brush and washed with water.

- (c) Sand blasted finishes shall be obtained by sand blasting the thoroughly cured concrete surface of the same ages as given under (b) Tooled Finishes with hard sharp sand to produce an even, fine clean surface in which the mortar has been cut away, leaving the coarse aggregate exposed.
- (d) Aggregate transfer finishes may be effected by sticking a single layer of selected aggregate onto ply board or other suitable form liners which have been cut to size and coated with a layer of water soluble cellulose adhesive mixed with plaster sand. This layer should be just thinner than half the average least dimension of the aggregate. When the glue is set the liners are placed in the forms which are then concreted, care being taken to protect the forms when placing and compacting. Liners shall be stripped after at least 3 days and the adhesive and sand covering the aggregate removed by scrubbing and washing.

Class 5 – Applied Finishes

It is essential that all surfaces on which applied finishes are to be used shall be sound, clean and free of mould oil.

Defects shall first be made good.

- (a) Rendered finishes require a good key. Unless otherwise specified this may be provided by flicking on to the previously soaked and still moist surface of 1 part cement to 2 parts of sharp sand. This shall be left untouched apart from curing.

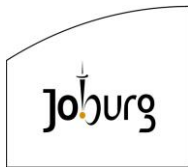
The render coat shall consist of 1 part Portland cement, or Portland 15, ½ part slaked lime, 4 to 4½ parts of sand by volume and shall not be less than 5mm or more than 16mm in thickness.

If a second coat is required because of the irregularity of the concrete, the surface of the first coat shall be combed with uniform wavy lines to provide a key after it has begun to harden. The second coat may be applied the next day. If a scraped finish is specified the rendering shall be lightly scraped to achieve the desired affect with an old tenon saw blade or similar implement, after it has attained a biscuit like crispness. It shall then be lightly brushed and washed to remove loose particles.

All rendered finishes shall be cured.

- (b) Painted finishes of the type specified shall be applied strictly in accordance with the paint manufacturer's instructions. Very smooth surfaces shall be acid washed, lightly sand blasted or rubbed with abrasive stones before being painted. Painting

Employer:		Contractor:	
Witness:		Witness:	



shall be delayed as long as possible and two coats applied unless otherwise specified.

Concrete Upper surface Finishes

Classification

Surface finishes to exposed (non-formed) concrete faces shall be classified as hereunder –

- Class 1 – screeded finish
- Class 2 – broomed finish
- Class 3 – wood float finish
- Class 4 – steel trowel finish

Class 1 – Screeded Finish

Immediately after placing, the concrete shall be screed with a true edged wooden board working between forms or other guides set accurately to line and level. No mortar shall be added and noticeable surface irregularities caused by the displacement of coarse aggregate shall be made good by re-screeding after removing or tamping down the interfering aggregate.

Class 2 – Broomed Finish

Immediately after placing, the concrete shall be screed as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be broomed with a stiff broom or brush to expose the aggregate. Dust and loose particles shall be gently washed away once the desired relief has been obtained.

Class 3 – Wood Float Finish

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be brought to a smooth and even finish using a wood float and including any additional 4:1 sand and cement as necessary.

Class 4 – Steel Float Finish

Immediately after placing, the concrete shall be screeded as in Class 1. Thereafter, when the concrete has begun to dry, the surface shall be brought to smooth and even finish using a steel float and including any additional 4:1 sand and cement as necessary.

PSG 5.2.2 PREPERATION OF FORMWORK

Add the following:

Shutter release oil or any other contaminants will not be permitted on any of the reinforcing steel.

Employer:		Contractor:	
Witness:		Witness:	

Wedges and clamps shall be used in preference to nails for securing the form components and wire ties or tie bolts in reinforced concrete must be capable of complete removal after use, except as otherwise specified. Where oil is used it shall be applied before any reinforcement is placed in position.

PSG 5.2.5 REMOVAL OF FORMWORK

PSG 5.2.5.2` REPLACE THE ENTIRE CONTENTS WITH THE FOLLOWING:

Where test cubes to determine stripping times are not made, the minimum periods, which shall elapse between the time of the placing of the concrete and the time of removal of the forms shall, unless otherwise agreed with the Engineer, be in accordance with the table hereunder, where each day covers a full 24 hour period.

Minimum stripping time in days:

	CEM 1	CEM 1	CEMII/A & CEMII/B (max 29% extender)	CEMII/A & CEMII/B (max 29% extender)	CEMII/B (30-35% extender)	CEMII/B (30-35% extender)
TYPE OR STRUCTURAL MEMBER OR FORMWORK	Normal weather (Above 15°C)*	Cold weather (Below 5°C)*	Normal weather (Above 15°C)	Cold weather (Below 5°C)	Normal weather (Above 15°C)	Cold weather (Below 5°C)
Beam sides, wall or unloaded columns	1	2	2	4	2	6
Slabs, with props left underneath	4	7	5	8	6	10
Beam soffits, props left under	7	12	8	14	10	17
Removal of slab props	10	17	10	17	12	21
Removal of beam props	14	21	14	21	18	28

*Average daily temperature of the atmosphere adjacent to the concrete as measured by a maximum and minimum thermometer. When the average daily temperature is between 5°C the minimum stripping times shall be interpolated from the table.

The table assumes that the member concerned is not subjected to any heavy construction loads and that the total force to be supported is not more than half the design load. Where heavier loads are to be carried, no stripping of soffits shall be permitted until the concrete has attained its full strength. Any days during which the average temperature was below 2°C shall be completely disregarded.

In the case of walls and columns the stripping times shall be determined by means of cube test results in the first instance, so as to ensure that no damage is caused to the structures by removing formwork.

Employer:		Contractor:	
Witness:		Witness:	

PSG 5.2.5.6 THERMAL SHOCK AND THERMAL CONTRACTION CRACKING

When it is possible that a temperature differential of 20°C or more may exist within the concrete or between the concrete surface and its surroundings, special precautions shall be taken by the Contractor to avoid thermal shock or thermal contraction cracking. The advice of specialists in the field of concrete technology will be sought and their recommendations regarding the peculiar set of circumstances will be implemented.

PSG 5.4 PIPES AND CONDUITS

Add the following:

The clear space between pipes of any kind embedded in reinforced concrete and the clear space between such pipes and reinforcement shall not at any point be less than 40mm or 5mm plus the maximum size of coarse aggregate, whichever is the greater.

The puddle flanged inlet, outlet, drainage and scour pipes shall be fixed in line and position under and in the walls by the Contractor as shown on the drawings. All pipe work shall be cast into walls at the time of pouring. The use of “windows” to cast in pipe work at a later date shall only be permitted upon approval by the Engineer.

PSG 5.5 CONCRETE

PSG 5.5.1 QUALITY

PSG 5.5.2,0 GENERAL

Add to G 5.5.2,0

The concrete shall also comply with the requirements for Durability stated in PSG 7.3.8

PSG 5.5.1.4 CHLORIDE CONTENT

Replace the entire contents of the clause with:

The chloride content, measured as Cl^- of all concrete in the structure as measured by BS 1881: 124: 1988 shall not exceed 0.2% mass cement.

The maximum chloride of the fine aggregate shall be 0.2% by mass as Cl^- as measured by SABS Method 830: 1976.

PSG 5.5.1.7 STRENGTH CONCRETE

Add to G 5.5.1.7:

The cubes from the trial concrete mix are to be tested at a nominated concrete design laboratory, and only the results of these tests will be considered for approval.

Employer:		Contractor:	
Witness:		Witness:	

The minimum content of combined cementitious material shall not be less than 375kg/m³, maximum content 450kg/m³ and the maximum water/cement ratio shall be 0,5. The Contractor shall also submit for approval the proposed slumps and the proportions in which he proposes to use the materials for each grade of concrete in each type of construction. In addition he shall state the minimum cement/water ratio in terms of total water in the mix for each grade of concrete, and the use of any admixtures.

No structural concrete shall be placed on the job until the contractor has satisfied the Engineer as to the suitability of the mixes concerned.

The Contractor shall be deemed to have satisfied himself, before tendering, of his ability to produce concrete of the required quality with available materials conforming to the specification.

Add:

PSG 5.5.1.8 BLEEDING

Concrete shall be so proportioned and the materials so selected that bleeding is kept below 0.30mm/cm² as measured by the ASTM C232 – 99 test.

Add:

PSG 5.5.1.9 SHRINKAGE

Concrete shall be so proportioned by the selection of materials that shrinkage as measured by the SABS 1085 test is kept below 0.06% when batched at the maximum slump allowed.

Add:

PSG 5.5.2,00 TEMPERATURE OF CONCRETE

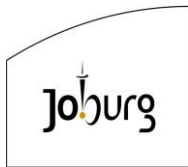
The temperature of the concrete shall be measured when it is delivered to site from a batch plant or a concrete supplier and shall be within the range 10°C and 30°C. Concrete which has a temperature outside of that range shall not be place in the structure.

Add:

PSG 5.5.2,01 RATE OF HYDRATION

The rate of hydration of the cement in the concrete shall be such that the concrete can be placed and properly compacted, 2 hours after the addition of water to the mix even in hot weather. Conversely, the initial set of the concrete must not be unduly delayed by low temperature, inappropriate use of admixtures or cement type, so that bleeding is promoted.

Employer:		Contractor:	
Witness:		Witness:	



PSG 5.5.2 BATCHING

PSG 5.5.2.1 For grade 35/26 concrete, only cement types CEM 1 (OPC, Duratech), CEM 11/A (Eagle Plus) or CEM 11/B (Structcrete, Durastruct, Surecrete) shall be used. No site blending of cement extenders will be permitted.

PSG 5.5.2.2 WATER

Replace entire contents with the following:

Dependable equipment shall be provide for measuring the mixing water either by mass or by volume to an accuracy within 3%

The accuracy of the measuring device provided shall be checked whenever required by the Engineer or his representative by allowing it to discharge into vessels of accurately known capacity.

The total quantity of water allowed for shall include the free water present in the aggregates. The moisture content of the fine aggregate shall be determined at the beginning and half way through each concreting shift, after showers of rain or at such other intervals as may be required by the Engineer.

PSG 5.5.2.3 AGGREGATES

Replace entire contents with the following:

Each size of aggregate shall be measured separately by weighing to an accuracy of 2% except where other methods are authorised or ordered by the Engineer.

Where suitable volumetric methods of measuring proportions of aggregates are permitted, these shall be checked at regular intervals, and shall take full account of bulking of the fine aggregate as delivered to the mixer. These methods shall be designed in such a manner that the consistency of the mix shall be as readily controlled as for mechanical batching.

All measuring devices shall be maintained in good order and condition, and no build-up of material on any part of the equipment shall be permitted.

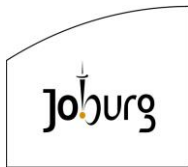
PSG 5.5.3 MIXING

PSG 5.5.3.1 MIXING AT CONSTRUCTION SITE.

Add the following:

Mixing shall continue until there is a uniform distribution of the materials and the mixture is uniform in colour. The minimum period of mixing shall be not less than that recommended by the manufactures at the recommended speed and not more than 30

Employer:		Contractor:	
Witness:		Witness:	



minutes. The entire contents of the mixer shall be removed from the drum before the materials for the succeeding batch are loaded.

Where hand mixing is permitted, the quantities of cement used shall be increased by not less than 10% over those determined for the appropriate mix design. The concrete shall be mixed on a clean and watertight platform.

PSG 5.5.3.2 READY MIXED CONCRETE

Add the following:

The concrete batching plant is to be inspected by the Engineer for compliance with SABS tolerances and his approval is to be obtained in writing before commencement of the concrete works.

A maximum delivery period of 90 minutes from the time water is added to the concrete mix to the actual discharge of concrete on site shall be permitted. The discharge period (including placing the concrete) shall not exceed 30 minutes.

The concrete slump of every truck shall be measured on delivery and shall comply with Clause SABS 1200 G 5.5.1.2 prior to any concrete from that truck is placed.

A detailed computer printout of the constituents of the concrete mix from the batching plant is to be handed over to and retained by the Engineers representative on site on arrival (i.e. truck registration, mix proportions and the time water was added to the mix). The masses of the concrete constituents of each truck shall be checked against that of those submitted with the trial mix, subject to the batching accuracy as specified in SABS 0100-2: 1992. The arrival time of each truck on site and the time that the concrete discharge is completed shall also be recorded by the Engineers representative.

Before any ready-mixed concrete is used on the job, the contractor shall furnish the Engineer with a copy of his letter to the suppliers in which he specified –

- (i) The type of cement;
- (ii) The nominal maximum size of aggregate;
- (iii) The cement / water ratio;
- (iv) The required compressive strength;
- (v) The required slump at the time and place of delivery; and
- (vi) The type of additive.

All these properties shall be as specified in the contract documents.

When required the contractor shall satisfy the Engineer that acceptable alternative means of supplying concrete have been arranged to be brought into operation in the event of disruption in the supply of concrete. In this connection, the Engineer may

Employer:		Contractor:	
Witness:		Witness:	

require that the alternative means of supply shall commence if the disruption in the supply of ready-mixed concrete has lasted for and elapsed period in time of 1½ hours.

The use of ready-mixed concretes shall in no way relieve the contractor of any of his responsibilities for providing concrete complying with the specifications.

For grade 35/26 concrete, a CEM I or CEM II cement may be blend with pulverised fly ash (PFA) or ground granulated blast furnace slag (GGVS) and/or condensed silica fume (CSF), such that the combined cementitious material comprises not less than 65% cement clinker and a maximum of 35% of extender and/or other additional constituents by mass. The minimum content of combined cementitious material shall not be less than 375kg/m³ and the maximum water/cement ratio shall be 0,5.

The concrete mixes for the abovementioned grades of concrete shall be designed by an approved concrete design laboratory. At least four weeks before placing any structural concrete on the site, the Contractor shall supply and deliver to the laboratory, at his own cost, samples of the aggregates and the concrete mix design he proposes to use for the works. The Contractor shall include in his tender all fees and charges levied as well as all other costs incurred in designing the required strength concrete mix.

PSG 5.5.4 TRANSPORTATION

Add the following:

Containers for transporting concrete shall be cleaned of all hardened concrete and foreign material.

During transportation the concrete shall be protected from wind and sun; shall be prevented from drying out or losing moisture and shall not be subjected to excessive jarring or jolting. Drying out may be prevented by the provision of covers and / or other protective devices.

PSG 5.5.5 PLACING

Add the following:

Where plums are permitted they shall be deposited by hand.

Freshly placed concrete shall be protected from rain damage.

No concrete shall be placed if the air temperature in the shade is below 8°C. Concreting shall not commence if the air temperature in the shade is above 35°C. The temperature of the concrete at the point of placing shall not exceed 30°C unless otherwise specified.

PSG 5.5.5.10 STRUCTURAL CONCRETE

During the whole or any time that the placing of concrete is being carried out, the concreting operation shall be under the supervision of a suitably experienced person.

Employer:		Contractor:	
Witness:		Witness:	

The wall footings shall be cast with wall starters to form a horizontal wall construction joint as shown on the drawings. The construction joint between footing bays shall also be as shown on the drawings. At least 3 days shall elapse between pouring adjacent wall footings.

After the wall footings have attained a minimum strength of 18 MPa, but not later than 7 days, each bay of the wall section shall be cast to full height on the same day and vertical construction joints between bays shall be formed as shown on the drawings. At least 3 days shall elapse between the pouring of adjacent wall panels.

As soon as possible after the removal of the formwork in vertical joints or after the concrete has set in horizontal joints the surface laitance of the concrete shall be removed in order to expose the large aggregate and leave a solid surface.

Openings may be left in the formwork on the outside face only for pouring and vibrating of the concrete provided they are closed properly and do not impair the concrete finish.

When concreting walls, care shall be taken to ensure that there is no loose matter on the concrete surface and that it is slightly wetted in order to assist the new concrete adhering to the existing concrete.

The Contractor's attention is particularly drawn to the fact that the walls form part of a water retaining structure and that no honeycombing will be tolerated. In order to ensure this, the mix proportions of the first 250mm depth of concrete placed in contact with the horizontal joint may be adjusted, with the approval of the Engineer, by reducing the amount of coarse aggregate. The Engineer's representative may instruct the use of trunking in placing the concrete to avoid losses of fines due to adherence to reinforcement and formwork. The concrete shall be placed evenly over the surface to be covered without reliance on vibration to transport it horizontally. Special care shall be given in order to ensure full compaction at water stops.

The floor shall be cast in panels as detailed on the drawings. Consecutively cast panels shall not adjoin one another. The floor panels shall be cast in a checkerboard pattern with a minimum of 3 days between the pouring of adjacent panels.

The column and column head shall be cast in one lift. The base of the column may be cast first provided a centrally placed starter is incorporated.

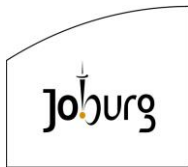
The contractor may use alternative means of construction which shall be subject to the approval of the Engineer. If the Engineer accepts any alternative means of construction it shall in no way result in increased costs.

PSG 5.5.6 COMPACTION

Add:

- PSG 5.5.6.5** If required by the Engineer, the concrete shall be re-worked by re-vibration 1 to 3½ hours after placing. The time shall be decided by the Engineer, taking cognisance of the mix, the ambient temperature and the workability of the concrete.

Employer:		Contractor:	
Witness:		Witness:	



PSG 5.5.7 CONSTRUCTION JOINTS

PSG 5.5.7.1 Add the following:

Any additional construction joints required by the contractor shall be approved by the Engineer. Where “off the form” finishes are specified, joints shall be arranged to coincide with the edges of boards or panels wherever possible.

Only those construction joints shown on the drawings shall be measured and paid for. The contractor shall allow in his pricing for any additional construction joints that he may require.

PSG 5.5.7.3(b) Construction Joints when concrete is more than 24 hours but not more than 3 days old.

Delete and replace with the following:

The surface of the concrete shall be sandblasted or chipped with a light hammer, swept clean and thoroughly wetted. In addition, the first layer of concrete placed in walls over a depth of approximately 250mm shall be made richer by reducing the amount of coarse aggregate by 25%.

PSG 5.5.7.4

Add the following:

- a) All horizontal and vertical construction joints shall be cleaned of all dirt and loose particles and shall be prepared to the satisfaction of the Engineer. Formed keys shall be provided if shown on the drawings or if instructed by the Engineer. All intersections of construction joints with concrete surfaces which will be exposed to view shall be made straight and level or plumb and shall be constructed to the details shown on the drawings.
- b) The Contractor is to provide a compressor (with oil traps) on site for the whole period during which concreting is in progress, and this must be available for cleaning concrete faces prior to placing fresh concrete or pouring joints. The cost of this plant and operation is to be allowed for in the Contractors rate for concrete.
- c) “Blowing-off” may generally be carried out on horizontal surfaces but, under special circumstances approved by the Engineer, it may be carried out on vertical surfaces. The surface concrete to be prepared shall be between 4h and 8h old after completion of placing and shall be blown of using a mixture of air and water under a pressure of at least 500kPa or by using a high pressure water jet until all dirt, laitance, etc is removed and particles of clean coarse aggregate are exposed sufficiently to produce a rough surface. Any loose particles of coarse aggregate shall also be removed. The success of this method of preparation depends on selecting the correct time (dependant on the type of cement and atmospheric conditions) so that the concrete has set to just the necessary degree of hardness. The operation may therefore require to be undertaken outside normal working hours and at night. When the surfaces are at least 12h old any remaining loose or fine aggregate particles shall be washed off.

Employer:		Contractor:	
Witness:		Witness:	

- d) The removal of all surface laitance plus roughening the concrete surface with hand tools in order to expose the coarse aggregate in a uniform pattern, is to be carried out on both horizontal and vertical surfaces. These areas should then be cleaned with a stiff brush under running water. The surfaces to be prepared in this manner shall be at least 12 hours old after mixing the concrete. At least 35% of the roughened surface area shall consist of exposed coarse aggregate.
- e) All prepared surfaces shall be kept continuously wet until the next lift of fresh concrete is to be placed against them; the minimum time being 12 hours.
- f) No fresh concrete shall be placed on the top surface of concrete which is laterally restrained (e.g. by formwork or by in-situ earth) while the bottom layer of concrete is between 3 hours and 12 hours old after mixing. No fresh concrete shall be placed on top of the concrete with an unrestrained lateral surface while the bottom layer of concrete is between 2 hours and 12 hours old after mixing.

The internal surface of joints in the reservoir floor and walls shall be sealed with a surface mounted "Hypalon" bandage system having an epoxy fixing system, all materials and procedures conforming to the "Sikadur-Combiflex" surface sealing system as produced by Sika (Pty) Ltd, or similar approved. The Contractor must ensure that where one Hypalon joint intersects another (at right angles or otherwise) that the two layers of intersecting Hypalon are not epoxied to each other and thereby restrained from moving. i.e. The Hypalon inside an intersecting joint must not be restrained by the epoxy adhesive and the full intended width should be free to move in the intended directions.

A 1mm thick Hypalon bandage is to be used on walls less than 6.5m and a 2mm thick bandage is to be used on walls greater than 6.5m.

The construction joints on the top (and sides where detailed on the drawings) of the reservoir roof slab are to be sealed with a 75mm wide self adhesive aluminium foil strip (Bostik "Ditsit" or similar approved) which shall be installed in accordance with the manufacturer's instructions. The "Ditsit" is to be taken over the edge of the roof slab and down the side of the wall for a distance of 500mm.

The construction joints on the soffit of reservoir roof slab are to be sealed with 2 coats of a 75mm wide application of Sika Top-Seal 107 (or similar approved) applied in accordance with the manufacturer's recommendations. The soffit of the reservoir is to be ground down 1.5 to 2mm with an angle grinder and then wire brushed and sprayed clean with water. The slurry is to be applied to a damp surface.

PSG 5.5.7.5 WATER STOPS

Water stops are to be placed in all wall and floor construction joints to the manufacturer's specification. The waterstop in the floor joints will be "rearguard" type "Expandite Supercast Rearguard R" or similar approved and in the walls will be "dumbbell" type "Expandite Supercast Watafoil" or similar approved as specified on the drawings.

Water stops, where specified, shall be placed or kept in position as shown on the drawing. Care shall be taken during concreting to ensure that waterstops are not displaced, bent over or punctured.

Employer:		Contractor:	
Witness:		Witness:	

All waterstops shall be manufactured from virgin polyvinyl chloride that complies with the following minimum performance requirements:

Tensile strength	12,2Mpa	(min)
Elongation at break	250%	(min)
Water soluble content	0,15%	max)
Softness (BS 2571)	38 to 50	

They shall be of the dumb-bell type and eyeleted or supplied with metal clips for the purpose of accurately fixing the waterstops between the reinforcement.

In each construction joint 150mm wide PVC waterstops shall be placed as shown on the drawings.

All intersection points shall be factory made pieces.

All joints in straight lengths and between straight lengths and intersection places shall be hot welded in accordance with the manufacturer's instructions. Jointing other than by hot welding will not be permitted.

Waterstops shall be carefully positioned and tied to the reinforcement to prevent displacement. Every precaution shall be taken to ensure maximum compaction around the waterstop. The waterstops shall then be returned to their horizontal positions ensuring that no voids are formed beneath them.

PSG 5.5.8 CURING AND PROTECTION

Add to G 5.5.8 (d):

Free from rents and tears and lapping by not less than 150mm, the surface being resprayed whenever any sign of drying out is evident.

Replace entire contents of G 5.5.8 (e) with:

Covering with an inner hessian membrane and an outer plastic membrane. The hessian membrane is to be kept continuously damp by an independent automatic sprinkler system. The hessian and plastic membranes are to be firmly secured and kept flush to the concrete surface at all times.

Add the following:

PSG 5.5.8 (f) Retaining forms in place

PSG 5.5.8 (g) Steam curing may be used on approval as specified by the Engineer, provided that the rate of increase in temperature does not exceed more than 20°C per hour. Steam curing at higher than atmospheric pressure shall not be permitted if the concrete contains limestone aggregate. Humidity shall be kept between 90% and 100%.

Employer:		Contractor:	
Witness:		Witness:	

PSG 5.5.8 (h) the use of curing compounds will not be permitted

Delete the last two sentences of G 5.5.8 and replace with:

The minimum period of curing various types of cement shall be as follows from the date and time of casting:

- | | | |
|--------------------------------|---|---------------------|
| (a) CEM 1 | - | 7 DAYS (168 hours) |
| (b) CEM 11 (max.29(% extender) | - | 8 days (192 hours) |
| (c) CEM 11 (30-35%) | - | 10 days (240 hours) |

During periods of extreme temperatures, these periods may be increased at the discretion of the Engineer. The temperature of concrete shall be retained above 5°C for a period of 3 days after placement. Should the environment in which the concrete is placed be such that temperatures drop below 5°C in the concrete, then use shall be made of insulated formwork to retain the heat generated by cement hydration within the concrete.

Curing methods to be utilised for water retaining structures

Concrete Element	Curing Method
Reservoir floor slab	G 5.5.8 (a), (b) or (d)
Reservoir walls	G 5.5.8 (e)*
Top surface of the reservoir roof slab	G 5.5.8 (d)
Soffit of the reservoir roof slab	G 5.5.8 (f)
Reservoir columns	G 5.5.8 (e)*

*-As amended

The rates for “Curing of Concrete” in the Schedule of Quantities will be paid to the Contractor on the successful outcome of the durability tests.

PSG 5.5.9 ADVERSE WEATHER CONDITIONS

PSG 5.5.9.2 Delete reference to 32° and replace 30°C.

PSG 5.5.9.4 WEATHER STATION

The Contractor is to provide equipment to monitor the wind speed, humidity, temperature and hence calculate evaporation rates at the site. If the rate of evaporation in site exceeds 0,5kg/m²/hour, exposed concrete surfaces shall be protected to prevent

Employer:		Contractor:	
Witness:		Witness:	

plastic cracking. I should be noted that plastic cracking may occur in cool weather with high wind velocities as well as in warmer weather conditions. If in the opinion of the Engineer, the weather conditions are too extreme and run the risk of adversely affecting the concrete, he may instruct the Contractor not to pour any more structural elements that day. The Engineer may call for protection against the wind to be provided, or the finished concrete to be covered with a plastic sheet or a fog spray to be utilised. Similarly, if it appears likely to rain, the Engineer may instruct the Contractor not to pour any further concrete. An extension of time (without P and G costs) may be allowed at the Engineers discretion for delays incurred due to inclement weather. Any additional costs for these delays and/or protective measures are to be allowed for in the Contractors rates for concrete work.

PSG 5.5.10 CONCRETE SURFACES

Add:

PSG 5.5.10.4 The Contractor shall make every effort to prevent blowholes from appearing on the off the form smooth finish. All noticeable defects shall be repaired to the Engineer's satisfaction.

PSG 5.5.14 DEFECTS

Add the following to G 5.5.14.1

Water retaining concrete shall be as dense as possible and no honeycombing will be permitted. If honeycombing is found to be a problem the Contractor shall re-assess the concrete mix proportions and his concrete placing methods. No additional payment shall be made for using this mix.

Add the following to G 5.5.14.2

All concrete repair work will be carried out as described below. Repair mortars containing PVA Latexes shall not be used in any water retaining structures.

1. Honeycombing:
The area to receive patch material shall be primed with a bonding slurry (e.g. Sika Mono Top 610 or similar approved). The patch will then be built up while the slurry coat is still tacky by means of an approved cementitious polymer modified mortar (e.g. Sika Mono Top 615 HB Prostruct 528 or similar approved).
2. Shrinkage cracks:
A low viscosity solvent free structural epoxy resin is to be used to fill the cracks (e.g. Sikadur 52, ABE Epidermix 365/389 or similar approved).

PSG 5.5.14.3 PATCHING AND REPAIR

Where defects do not warrant the removal of defective concrete, one or more of the following procedures shall be required by the Engineer:

Employer:		Contractor:	
Witness:		Witness:	

- (a) Where the structural strength might be affected and must be restored, repairs may be effected by the application of either pneumatically-placed mortar or of a mortar made of silica sand and an approved epoxy formulation mixed and applied in accordance with the manufacturer's recommendations.
- (b) Where there are no fears as to structural strength, all defective material shall be chipped away until a dense uniform surface of concrete exposing solid coarse aggregate is obtained. Feathered edges shall be cut away to from surfaces perpendicular to the concrete face. Seized shutter bolts shall be cut back to at least 35mm into the concrete. All loose material shall be hosed away and the surface of the cavity shall be saturated with water for at least 3 hours, after which a thin layer of neat cement mortar shall be applied to the surface. The cavity then shall be filled with stiff mortar mixed in the same proportions of cement to sand as that used in the original concrete. The mortar shall be thoroughly tamped into place in layers. The use of up to 30% white cement in place of the normal cement may be required to reduce the darker appearance of a patch. An interval of thirty minutes shall then elapse before a final surface tamping in given to the patch, after which the surface shall be treated to resemble the surrounding concrete as closely as possible. Board marks may be reproduced by striking a suitable piece of timber held against the plastic concrete. The patch shall be neat and workmanlike in appearance an after completion it shall be kept wet for a period of at least three days.

The cost of repairing any defective concrete shall be to the Contractors account.

The preparation, application and curing of the above repair materials shall all be in strict accordance with the Manufacturer's instructions.

Add the following Clause:

PSG 5.5.16 NO-FINES CONCRETE

Only sufficient water shall be added to the mix to produce a smooth grout to completely cover each and every particle of aggregate.

Proportions may be varied on site with the approval of the Engineer to obtain a more satisfactory result. The upper surface on the no-fines is to be finished off with a wood float to provide a smooth working surface while adding just sufficient dry mix cement-sand mortar 1 to 8 ratio to close the upper surface of the voids in order to prevent ingress of foreign matter and concrete from the blinding/floor concrete into the interstices.

Mixing shall be carried out in a mechanical batching plant and the hopper shall first be charged with the aggregate to which a small quantity of water has been added to moisten aggregate particles. The cement shall then be added followed by the remainder of the water.

Employer:		Contractor:	
Witness:		Witness:	

The no-fines concrete shall be placed within 20 minutes of having been mixed and shall be rodded and hand tamped into position. The use of vibrators will not be permitted.

No traffic shall be permitted to traverse the surface of the no-fines concrete during the three days following upon placing and thereafter only over planks or boards placed for that purpose.

No-fines drains shall be measured per metre and shall include for the porous concrete pipe and the encasement in no-fines concrete.

No-Fines Concrete

General

Unless otherwise specified, no-fines concrete shall only be used for non-structural work.

Grading of Aggregate

Aggregates for no-fines concrete shall be graded so that not more than 10% by mass of aggregate is retained on a sieve having 19mm square openings and not more than 5% by mass passes a sieve having 9,5mm square openings.

Mix proportion

No-fines concrete shall be mixed with one part of cement to 9 parts of aggregate.

PSG 6 TOLERANCES

PSG 6.2 PERMISSIBLE DEVIATIONS

PSG 6.2.3(a) Replace with the following:

Description	Permissible Deviation in mm	
	Degree	
	III and II	1
Spacing between two adjacent bars	± 20	± 15
Dimensional position of bar	± 20	± 10
Longitudinal location of bends and ends of bars	± 30	± 20
Cover to reinforcement	-0 + 10	-0 + 5

Employer:		Contractor:	
Witness:		Witness:	

PSG 6.2.3(h) Add:

Tolerances for bow or camber, twist, squareness and for silos and skip form concrete, pre-stressed concrete and precast concrete will be stated in Part Project Specification wherever applicable.

PSG 7 TESTS

PSG 7.1 FACILITIES AND FREQUENCY OF SAMPLING

PSG 7.1.2 FREQUENCY OF SAMPLING

PSG 7.1.2.2 Replace the entire contents of the clause with:

The Contractor shall provide the following number of sets of three standard metric 150mm metal cube moulds for the volume of concrete pour as per the table below:

Table 4 - Frequency of compressive strength tests

Volume of pour (m3)	Number of sets
0 – 25	2
26 – 50	4
51 – 100	6
101 – 200	8
+ 201	10 (or as required by the Engineer)

These sets of concrete cubes will be crushed when they are 7 and 28 days old.

Provide sufficient extra cube moulds for 3 days, 7 days, etc, crushing tests to be made as he so requires for his own purposes i.e. for shutter stripping, post-stressing cables.

Make and cure all cubes on site under the supervision of the Engineer, in accordance with SABS Method 863.

Be represented at the crushing test if he so wishes.

Transport all cubes to the nominated laboratory between 7:30am and 11am on the last working day prior to the date of test. Only the results from this laboratory will be considered and will be the sole basis on which concrete is accepted or rejected.

Employer:		Contractor:	
Witness:		Witness:	

PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE

Delete the entire contents of G 7.3.1 and G 7.3.2 and replace with:

PSG 7.3.1 The Contractor is hereby advised that the basis, on which concrete will be accepted or rejected, is on the 28-day cube strength obtained from cubes crushed at the nominated laboratory. Unless the conditions of sampling, cube manufacture, cube curing and record keeping are strictly adhered to, the test results will be meaningless. To this end it is emphasised that the Contractor must strictly comply with all the concrete test methods specified in SABS Method 861.

Table 5 - Acceptance criteria for concrete strength

Acceptance Category	Strength Cs = Average minimum strength for 3 cubes at 28 days (Mpa)
Characteristic strength for water retaining structures	35
Full acceptance	$Cs \leq 37$
Conditional acceptable	$33 \geq Cs > 37$
Rejection	$33 < Cs$

The descriptions given in the "Acceptance Categories" column above shall have the following meanings.

Full acceptance - Concrete shall be accepted unconditionally, subject to the concrete meeting the durability and cover criteria.

Conditional acceptance - Concrete shall be accepted with a warning that construction methods should be examined to improve the strength. A financial penalty of up to R75/m³ will be applied on a pro rata sliding scale for all concrete poured where the average strength (for 3 cubes at 28 days) test results fall within the conditional acceptable range.

Rejection - At the discretion of the Engineer, the concrete shall be removed and replaced at the expense of the Contractor.

Core holes - That test cores shall be drilled from the concrete and tested in accordance with the SABS Method 865 to determine the estimated actual strength and the estimated potential strength of the concrete.

If the results of the core tests show that the concrete meets the test requirements, the structure shall be accepted. If the cores tests show that the concrete does not meet the

Employer:		Contractor:	
Witness:		Witness:	

strength requirements, an appropriate full-scale load test, as determined by the Engineer, shall be applied on the structure containing the defective concrete.

If load tests are, in the opinion of the Engineer, impracticable, or where the portions of the structure subjected to such test fail to pass the test specified, he shall have the right to require strengthening or replacement of the portions of the structure concerned.

Upon removal of the core the hole is to be dampened and filled with a stiff mix of an expanding cementitious grout (Sika Grout G.P. or similar approved). Thereafter, an external slurry coat (0,25 x 0.25m) of a polymer modified cementitious coating (Sika Top-Seal 107 or similar approved) is to be applied over the exposed surface of the core hole.

PSG 7.3.5 REPLACEMENT OR STRENGTHENING OF CONCRETE

Delete after the words “the Contractor shall”, and insert

“make adjustments in order to meet the specified requirements.”

Add:

PSG 7.3.6 Table 8 – Acceptance criteria for concrete cover

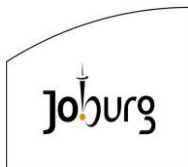
Acceptance Category	Concrete Cover (mm) (for specified cover of 50mm)
Full Acceptance	$70 > C_d \geq 50$
Conditional acceptance	$45 \geq C_d > 50$
Acceptance with remedial measures	$40 \geq C_d > 45$
Rejection	$C_d < 40, C_d > 70$

The descriptions given in the “Acceptance Categories” column above shall have the following meanings.

Full acceptance - Concrete shall be accepted unconditionally, subject to the concrete meeting the strength and durability criteria.

Conditional acceptance - Concrete will be accepted with a warning that construction methods should be examined to improve the cover. A financial penalty of up to R15/m² will be applied on a pro rata sliding scale for each structural element where the average test results fall within the conditional acceptable range .

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Acceptance with remedial measures - Concrete will be accepted if the Contractor undertakes remedial work at his expense, as approved by the Engineer, to improve the durability of the concrete to the criterion described as “full acceptance”.

Rejection - At the discretion of the Engineer, the concrete shall be removed and replaced at the expense of the Contractor.

Notwithstanding Clause 29.1 of the General Condition of Contract (Removal of improper work and materials) and Clause 30 of GCC (Contractor to search), the onus will be on the Contractor to prove to the Engineer the extent of the concrete for which the durability and cover values fall below the Specified Values (in the above tables), and the cost of this searching is to be included in the Contractor's rates for concrete.

An item has been included in the Schedule of Quantities for the making good of core holes as directed by the Engineer.

Where the Engineer or his representative has reason to doubt whether the concrete cover over the reinforcement is not in accordance with the requirements of clause PSG 5.1.3, the cover shall be tested with a cover meter. If necessary, the Engineer or his representative shall then indicate to the contractor where he must expose the reinforcement to prove the depth of cover.

Add:

PSG 7.3.7 COSTS OF TESTS

The costs of all tests required by the Engineer or his representative shall be borne by the Employer except that costs of tests as set out hereunder shall be borne by the contractor -

- (a) Preliminary tests on materials and of mix proportions;
- (b) All tests as may be made necessary by reason of the provisions of clause SABS 1200 G 7.3.5;
- (c) Such tests, including concrete coring and load tests, as may in the opinion of the Engineer be made necessary by failure on the part of the contractor to meet the requirements of this specification.

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Add:

PSG 7.3.8 DURABILITY INDEX TESTS

To ensure that the concrete has been placed, compacted and cured correctly, a number of tests will be carried out by a nominated laboratory on the concrete after curing has been completed ie 26 to 30 days after placing of the concrete.

- 1) A set of four 68mm diameter cores, 75mm in length will be drilled at each test location through the covercrete (being the concrete layer between the outermost layer of steel reinforcement and the exposed outer surface of the concrete element) from the constructed concrete element when the concrete has reached 28 days of age. A slice (30mm thick) will then be cut from the outer surface of this core such that the slice is representative of the middle layer of the covercrete (ie the middle layer being a 30mm thick slice of concrete, 15mm from the exposed outer surface extending in towards the reinforcement) and tested for: -
 - 1.1) Water sorptivity,
 - 1.2) Oxygen permeability (tested in the Ballim apparatus), and
 - 1.3) Chloride conductivity

The positions at which the cores will be extracted will be indicated by the Engineer.

The oxygen permeability and water sorptivity, and chloride conductivity test procedures shall be carried out in accordance with the following references:

- (1) Guide to the use of durability indexes for achieving durability in concrete structures. (Research Monograph No. 2)
 - (2) Concrete durability index testing manual (Research Monograph No. 4)
- 2) The depth of concrete cover achieved will be measured to ensure that the specified values have been achieved.

The cost of these tests will be borne by the Employer if the results are equal to or exceed the specified value. The Contractor will pay for the tests if the results fall below the conditional acceptance range.

N.B. The employer will pay for one set of tests per test.

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Witness:		Witness:	



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Table 7 – Acceptance criteria for durability testing structural element.

Acceptance Category	Oxygen permeability index (log scale)	Water sorptivity (mmh)	Chloride Conductivity
Full acceptance	$Op \geq 9.15$	$Ws \leq 8$	$Cc \leq 0.75$
Conditional acceptance	$9.0 \geq Op > 9.15$	$8 < Ws \leq 12$	$0.75 < Cc \leq 1.50$
Acceptance with remedial measures	$8.75 \geq Op > 9.0$	$12 < Ws \leq 15$	$1.50 < Cc \leq 2.50$
Rejection	$Op < 8.75$	$Ws > 15$	$Cc > 2.50$

The descriptions given in the “acceptance Categories” column above shall have the following meanings.

Full acceptance - Concrete shall be accepted unconditionally, subject to the concrete meeting the strength and cover criteria.

Conditional acceptance - Concrete will be accepted with a warning that construction methods should be examined to improve the durability. A financial penalty of up to R75/m³ will be applied on a pro rata sliding scale for each structural element where the average test results within the conditional acceptable range.

Acceptance with remedial measures - Concrete will be accepted if the Contractor undertakes remedial work at his expense, as approved by the Engineer to improve the durability of the concrete to the criterion described as a “full acceptance”.

Rejection - At the discretion of the Engineer, the concrete shall be removed and replaced at the expense of the Contractor.

PSG 7.3.9 WATER TIGHTNESS TESTING

A hydraulic test shall be undertaken on the reservoir structure before backfilling and no backfilling will be permitted before this test and the acceptance of the structure for watertightness.

All interior surfaces of the reservoir shall be broomed, cleaned and hosed down and the cleaning water run to waste.

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Witness:		Witness:	



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The reservoir shall then be filled slowly at a rate not exceeding 2m in 24 hours, and allowed to stand for 7 days to allow absorption to take place. The Contractor shall allow for adding chemicals supplied by the Client to sterilize the reservoir.

The water level will be taken thereafter every 24 hours for 7 days. A maximum drop in surface level of 12mm will be permitted over the full period of 7 days. Should the structure not stand this test the Engineer may order a second test and should this fail, the Contractor shall be responsible for finding the leaks and taking such measures as necessary and approved by the Engineer to produce a satisfactory test.

Water for the second and subsequent tests will be charged to the Contractor at current tariff rates.

The lump sum price for the hydraulic testing of the reservoir shall for cleaning all internal surfaces, adding chemicals and testing.

PSHA STRUCTURAL STEELWORK

PSHA 1 APPLICABLE SPECIFICATIONS:

SABS 1200 H: STRUCTURAL STEELWORK

SABC 1200 HC: CORROSION PROTECTION OF STRUCTURAL STEELWORK

PSHA 2 AMENDMENTS TO SUBCLAUSES OF SABS 1200 H:

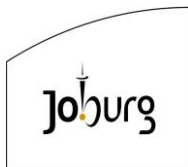
PSHA 2.1 SUBCLAUSE 3.1: STRUCTURAL STEEL

The steel shall be Grade 350W for hot rolled steel sections (I, H, C, L). All members shall carry the Grade 350W steel symbol to identify steel grade prior to manufacturing, unless otherwise shown on the drawings.

All other structural elements, tubular profiles, flat bars, squares, rounds, checker ("vastrap") floor plate shall be Grade 43 or as specified on the drawings. The thickness of a checker ("vastrap") floor plate, is the under-pattern thickness.

All stairs, ladders and handrails shall be SS 304L or as indicated on the drawings.

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PSHA 2.2 SUBCLAUSE 5.1 AND SUBSUBCLAUSE 5.1.2: CONTRACTOR PROVIDES SHOP DETAILS

The contractor shall furnish the Engineer with shop-detail drawings within two weeks of having received the design drawings. The Engineer will check the drawings for conformity with design requirements and will return the drawings with additions and corrections, if any, within one week of having received them. Detailed checking of shop details for dimensional accuracy and installation fit, will not be done by the Engineer.

PSHA 2.3 SUBSUBCLAUSE 5.2.3: CUTTING

The edges of flame-cut plates shall be ground smooth.

PSHA 2.4 SUBSUBCLAUSE 5.6.1: GROUTING RESPONSIBILITY

Grouting shall not be done by the steel contractor.

PSHA 2.5 SUBSUBCLAUSE 5.3.4: WELDING

(a) All welders shall be coded welders.

The contractor shall submit welding procedures by an approved welding authority for approval and shall produce evidence acceptable to the Engineer that welding procedures and welders have been tested in accordance with the requirements of SABC 044, Parts III and IV.

Approved splicing of members will be subject to non-destructive testing. The cost of testing shall be borne by the contractor.

(d) The Engineer may at his discretion identify welds for non-destructive testing by an approved authority the cost of which will be borne by the Contractor.

PSHA 2.6 SUBSUBCLAUSE 8.3.6: MEASUREMENT OF AND PAYMENT FOR PROTECTIVE COATING

Surface preparation, priming, shop and site painting shall be measured in m² of surface treated.

PSHA 2.7 SUBCLAUSE 7.1: TEST CERTIFICATES

Test certificates pertaining to the steel to be used shall be submitted to the Engineer by the contractor before fabrication commences.

The Engineer reserves the right to inspect all structural steel in the workshop before it is delivered to the site.

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PSHA 2.8 SUBSUBCLAUSE 7.2: INSPECTION

Third party inspections will be executed by an independent Inspectorate appointed by the Employer on behalf of the Engineer, in accordance with the proposed detailed Quality Control Plan (QCP). Inspections will be carried out at the Manufacturer's factory during and after manufacturing, during coating, storage & handling and installation on site. The frequency of inspection is permanent on the project unless relaxed by the Corrosion and Coating Engineer (CCE) of Johannesburg Water.

PSHA 2.8 SUBSUBCLAUSE 6.2.2: OTHER TOLERANCES

Degree of accuracy II shall apply unless indicated otherwise elsewhere.

PSHA 3 ADDITIONAL CLAUSES:

PSHA 3.1 PROTECTIVE TREATMENT AND PAINTING

PSHA 3.2,0 All paint shall be delivered at the workshop as well as on the site in the original containers that display the manufacturer's name and trademark as well as the SABS mark. The Engineer may, at his discretion, prescribe the manufacturer and the type of paint.

The coating system shall be from one manufacturer only. The paint manufacturer's instructions shall be strictly adhered to.

PSHA 3.2,0.2 Surfaces in contact with each other after assembly or erection shall receive the primer beforehand, except for faying surfaces for friction-grip fasteners.

PSHA 3.2,0.3 The application of the final coats of paint before erection will be permitted by the Engineer only in special circumstances or where specified elsewhere.

PSHA 3.2,0.4 After erection of the steelwork, the specified paint system shall be reinstated in all area where it has been damaged. All fasteners shall also be treated in accordance with the specified paint system.

PSHA 3.2,0.5 No painting on the site shall be done in inclement weather or when humidity or frost is liable to cause wet or damp conditions on the surface to be painted.

PSHA 3.2,0.6 No painting shall be done if the temperature falls below 7°C.

PSHA 3.2,0.7 Welded seams shall be thoroughly steel-brushed before painting. Permission shall be obtained from the Engineer before slag residue may be neutralized with acids or alkalis.

PSHA 3.1.2 SURFACE PREPARATION IN THE WORKSHOP

SIS 05 59 00 or ISO 8501 shall apply and shall be referred to in respect of this clause.

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Witness:		Witness:	



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PSHA 3.1.2.1 MANUAL SCRAPING AND WIRE BRUSHING

This treatment shall normally be applied in all circumstances except if and where blast cleaning is specified.

- Prior to treatment, the steel surface shall be cleaned of dirt and grease.
- Heavier layers of rust shall be removed by chipping.
- All loose mill scale, rust and foreign matter shall be removed by very thorough scraping, wire-brushing, machine-brushing, grinding, etc.
- Finally the surface shall be cleaned by vacuum cleaner, with clean dry compressed air, or with a clean brush.
- The surface shall have a pronounced metallic sheen with an appearance equal to or better than that shown on the prints designated ST 3 IN sis 05 59 00 or ISO 8501.

PSHA 3.1.2.2 BLAST-CLEANING

This treatment may be used but is not obligatory unless so specified hereinafter. If blast cleaning is preferred to normal scraping and wire brushing, the final surface shall be equal to or better than that specified in sub-sub clause 3.1.2.1.

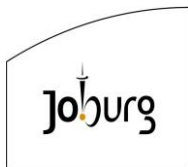
PSHA 3.1.3 PAINT SYSTEM

The paint system shall be applied in accordance with the specifications given in table 3.1 below. Application may be by brush, roller or sprayed. Red lead may not be used.

All structural steel which is not visible, eg purling, rafters and trusses, shall receive only the primer coat. All visible steel shall receive the full appropriate paint system treatment.

In all cases the manufacturer's specification for any paint product must be followed.

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Witness:		Witness:	



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Table 3.1 Paint system for new steel surfaces for unpolluted inland environments (not suitable for temperatures above 90°C)

Coat No	Place of application	Time of application	Min thickness in µm	Types	SABS - Specification
1. Primer	Workshop	Within 4 hours of surface treatment	50	Zink phosphate Plascoprime 182 QD (Plascon) or D193-1029 (Dulux)	(None)
2. Two final coats; colour as specified elsewhere	Site	After erection. 2nd coat within 48 hours of 1st	Each coat 25 to 40	High-gloss enamel or structural steel paint	630 Type 1 684 Type A

PSHA 3.2 PAINT SYSTEM FOR NEWLY GALVANIZED SURFACES

PSHA 3.2.1 RECOMMENDED SURFACE PREPARATION:

- Degrease with Plascon Aquasole Degreaser GR 1 or similar approved. Any cement or foreign material must also be removed from the metal surface.
- Rinse with clean running water while protecting the floors and walls.
- Wash with Galvanised Iron Cleaner GIC 1 by Plascon, or similar approved.
- Rinse with clean running water and allow to dry. Protect the floors and walls.

PSHA 3.2.2 Apply one coat of Plascon Aquafast Etch Primer no EMS 18 or similar approved to a total dry thickness of 35 micron. Must be overcoated within 72 hours to avoid excessive hardening.

PSHA 3.2.3 TWO FINAL COATS AS SPECIFIED IN TABLE 3.1

PSHA 4 HOT DIPPED GALVANIZING (See also subclause 5.9 in SABS 1200H)

Steelwork described as “hot dipped galvanised” shall be galvanised after manufacturing and before delivering to site by means of the hot dipped process complying with the minimum requirements of SABS ISO 1461, 2000 latest amendment. Structural steel members shall be given an 85 micron thick galvanised coating or such other thickness as may be specified in accordance with SABS ISO 1461 (Table 1).

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Witness:		Witness:	



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Damaged surfaces must be thoroughly cleaned and if welding has been carried out all slag must be removed preferably by the use of a chisel hammer.

Before galvanising all surfaces of the metalwork shall be thoroughly cleaned of all scale and rust by shot-blasting in accordance with SABS 064 or by pickling and then fluxed ready for galvanising.

The zinc coating shall be even and continuous over all surfaces, free of bare spots, dull or rough patches, blisters or other imperfections. The zinc coating shall show no signs of peeling and shall be uniform in thickness.

All M8 and greater bolts, nuts screws and other threaded components, shall be hot-dip galvanised to SABS ISO 1461 (previously articles type C).

Repairing of damaged coatings

Plant repairs

Should any black spots or uncoated areas greater than 5 mm² (individual) or 25mm² (collective) per m² or per m run be present after galvanizing, the coating shall be repaired. This is to be carried out using abrasive blasting followed by zinc metal spray. The zinc metal spray shall be applied at least 25% thicker than that specified and shall overlap the damaged area by 20-25mm. The finished coating shall be wire brushed to remove any excess metal spray.

Hot patch soldering is an alternative at the plant but is seldomly used, as the method needs to be conducted while the product is still hot before quenching.

Site Repairs

Zinc metal spray as set out above.

The recommended alternative is to use a zinc rich paint provided it has at least 90% zinc in the dry film, by mass. The paint should be a zinc rich epoxy in conformance with SABS 926. A single pack zinc rich paint such as Plascon's "Plascozinc Polygalv Primer" or equal can be applied.

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PSL MEDIUM-PRESSURE PIPELINES

PSL1 PIPE MATERIALS

PSL1.1 MILD STEEL PIPES, FITTING AND SPECIALS

Mild steel pipes and specials up to 150 mm nominal diameter shall comply with the requirements of SABS 62. Pipes and specials over 150 mm nominal diameter shall comply with the requirements of SABS 719.

Pipe specials shall be manufactured to the requirements of BS 534.

Mild steel pipes, fitting and specials shall furthermore comply with the following:

- a) Grade of pipe : Grade X42
- b) Pipe Wall thickness :
 - Pipe wall thickness for pipes with nominal diameter $\leq 500\text{mm}$ – $t = 4.5\text{mm}$
 - Pipe wall thickness for pipes with nominal diameter $> 500\text{mm} - \leq 700\text{mm}$ – $t = 5.2\text{mm}$
 - Pipe wall thickness for pipes with nominal diameter $> 700\text{mm} - \leq 900\text{mm}$ – $t = 6.0\text{mm}$
- c) End treatment : Plain, machined or flanged as indicated in the Schedule of Quantities and the Schedule of Steel Specials
- d) Pipe interiors : Weld reinforcement and upset material on the interior surfaces shall not exceed 1 mm
- e) Edges : All edges on pipe specials shall be rounded to a minimum radius of 3 mm prior to corrosion protection
- f) Corrosion protection : Refer Clause PSL 12 hereof
- g) Welding : Electric fusion welding

PSL1.2 UNPLASTICISED POLYVINYL CHLORIDE PRESSURE PIPES AND FITTINGS

uPVC pressure pipes and fittings shall conform to the requirements of SABS 966 Part 1.

All pipes and fittings shall have an integrally moulded joint with factory fitted rubber seal ring, unless other specified. Only full length pipes bearing the aforementioned

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markings will be acceptable. When laying pipes, the markings shall be visible from above.

uPVC Pipes and fittings must be carefully handled and stored and the Contractor must in particular observe the following.

- a) Pipes must be carefully off-loaded and under no circumstances may pipes be thrown of vehicles
- b) Pipes with socket ends must be stored on timber supports on the ground. The supports may not be placed more than 1.0 m apart
- c) Pipes may not be stacked higher than 1.0 m during transport or on stage
- d) The storage area must be level and free from stones and sharp objects
- e) The storage area must be free from dry grass or any material likely to constitute a fire hazard
- f) Pipes and fittings must always be stored in the shade; away from direct sunlight

The cost of cutting and trimming pipes shall be included in the rates for laying and jointing of pipes.

Except for bends up to 250 mm diameter, all fittings for use with uPVC pressure pipes shall be cast iron with wall thickness in accordance with SABS 546 and socket dimensions in accordance with SABS 966.

PSL1.3 HIGH DENSITY POLYETHYLENE PIPES (HDPE)

HDPE pipes shall be type IV in accordance with the requirements of SABS 533 for the working pressure as specified.

Only approved polypropylene compression fittings shall be used with HDPE pipes.

Welding fittings will not be permitted.

PSL2 ISOLATING VALVES AND STOPCOCKS

PSL2.1 CAST IRON GATE VALVES

All cast iron gate valves shall be WEDGE TYPE gate valves of the waterworks type in accordance with the requirements of SABS 664. The valves must be able to withstand a hydraulic working pressure of 1600 kPa and shall have plain, flanged or socket ends to suit the pipeline materials and/or fittings as specified.

The valves shall be provided with a straight, unobstructed body passage through the valve and the gate shall be completely clear of the waterway in the fully open position. The sealing and gate guide shall be of substantial design to support the gate until it closes and the gate shall be manufactured of cast iron and covered with bonded

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vulcanised nitrate rubber. The valve shall have a non-rising stainless steel spindle fitted with a cap top or handwheel and close anti-clockwise.

The valve spindle shall be provided with a lock-seal permitting the replacement of the spindle seals under pressure. The spindle seal shall consist of at least two O-rings located in a corrosion-resistant housing. A further wiper ring to prevent the ingress of dirt shall be provided.

All components shall be interchangeable between valves of the same size and all bolts and nuts in the construction of the valves shall be galvanised standard metric hexagonal bolts and nuts.

The valves shall be able to handle flow in both directions and be installed in reversible directions and are required to seal drop-tight from zero to a maximum pressure of 1.5 times the rated working pressure under test and field conditions.

The type and make of the gate valves must be approved by the Engineer prior to ordering thereof.

PSL2.2

BUTTERFLY VALVES

Butterfly valves shall have the following features:

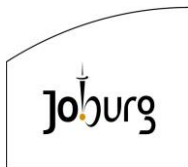
Body type	: Water for valves < 250 mm diameter Fully flanged for valve 300 mm diameter
Seating	: Replaceable
Dimensions	: Face-to-face dimensions must conform to the requirements
Operation	: Gearbox operation with hand wheel
Pressure rating	: Valves must be able to withstand a maximum hydraulic pressure of 1 600 kPa

Valve components shall be manufactured from the following materials:

Body	: Cast iron or Ductile iron to SABS 936 GRSG42
Disc and shaft	: Stainless steel
Seating and rings	: Replaceable rubber
Bearing	: Self-lubricating Vesconite

The type and make of the butterfly valves must be approved by the Engineer prior to ordering thereof.

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PSL2.3 BRASS STOPCOCKS, BALLCOCKS AND BIBCOCKS

Cast brass stopcocks, ballcocks and bibcocks shall be used for pipe diameters of 50 mm and smaller where specified on the drawings of Schedule of Quantities. The valves shall comply with the requirements of SABS 776, and shall be capable of withstanding a hydraulic working pressure of 1 600 kPa. The valves shall have screwed ends.

Stopcocks shall have special non-rising stems to prevent dezincification and be fitted with a handwheel for clockwise closing. The direction of the closing shall be marked on the handwheel.

The make of stopcock, ballcock or bibcock must be approved by the Engineer, prior to ordering thereof.

PSL3 SWING CHECK VALVES

Swing check valves shall be single or double door design and conform to the following requirements:

Body type	:	Wafer or flanged as specified
Body materials	:	Cast iron or carbon steel
Disk and hinge	:	Grade 316 stainless steel
O-ring	:	Nitrile rubber
Maximum working pressure	:	1600 kPa
Standard supply features	:	Counterweight and lever on door shaft Torsion spring (Iconel) to assist closing before flow reversal with lifting eye bolt.

The type and make of valve must be approved by the Engineer prior to ordering thereof.

PSL7 FIRE HYDRANT VALVES

Fire hydrants shall be tamper proof with a 65 mm diameter double aluminium alloy quick coupling complying with the applicable requirements of SABS 1128, Parts 1 and 2, and equipped with a squire spindle on which the keys of the local fire brigade shall fit. It shall furthermore comply with NBR 85, T-section, no 9613, dated 1 March 1985.

After installation of the fire hydrants they shall be painted with one undercoat of zinc chromate or a similar product complying with the applicable requirements of SABS 679, followed by two coats of medium yellow high-gloss enamel paint such as Plascon Code G6 or an approved similar product which conforms to the requirements of SABS 630.

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PSL8 PRESSURE GAUGES

Pressure gauges for monitoring water pressure in pipeline shall be glycerine-filled robust and shall comply with the following requirements.

Case	:	Solid brass forging with integral bottom entry stem and pressure vent in back of case.
Window	:	Non-splintering clear plastic
Dial	:	White aluminium with black lettering
Pointer	:	Black aluminium with black lettering
Bezel ring	:	Roll formed stainless steel ring
Connector	:	½" BSP male bottom entry connector
Scale range	:	0 to 1 600 kPa

The size of gauge is specified on the drawings and/or in the Schedule of Quantities.

PSL9 WATER METERS

PSL9.1 IN-LINE FULL BOREELECTROMAGNETIC FIELD FLOW METER

These types of meters are installed in-line using flanges and do not require the use of a strainer. Meters must comply with the following requirements:

1. Meter must be ISO7145, ISO4064|OIML R49 approved and must be delivered with a certificate of calibration.
2. Meter flanges must comply with SABS1123 Table 1600/3.
3. Meter must have a dual pulse (forward and reverse), 4-20mA and must have a Modbus output standard (HART optional add-on).
4. Meter must be able to be installed horizontally and vertically.
5. Meter must be PN16.
6. Meter must be able to work up to 70°C.
7. The enclosure sensor must be IP68 or higher.
8. Meters must comply with Johannesburg Water's metering policy.
9. The meter must be able to measure forward and reverse flow.
10. The meter needs to have an error of less than 0.5%

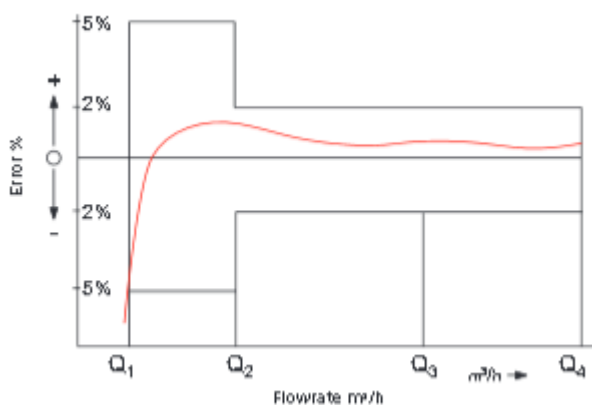
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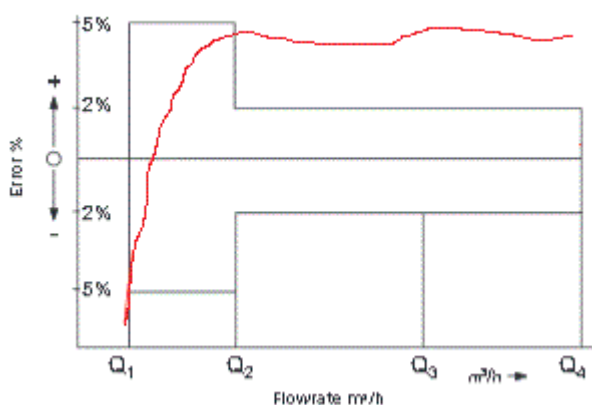


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PSL9.2 CLAMP-ON ULTRASONIC METERS

1. Meter must be ISO7145, ISO4064|OIML R49 approved and must be delivered with a certificate of calibration.
2. Meter must have a dual pulse (forward and reverse), 4-20mA and a MODBUS RTU with RS485 output standard (HART optional add-on output).
3. Meter must be able to be installed horizontally and vertically.
4. Meter must be able to work up to 50°C.
5. The meter needs to have an error of less than 5% as shown in the below graph.



6. The transducers need to be IP68 rated.
7. Meters must comply with Johannesburg Water's metering policy
8. Meter Housing needs to be IP68.
9. Meter needs to have a digital display showing totals.
10. Meter needs to be able to run off 24V DC.

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Where meter is located in a remote area meter is to be battery operated (refer to section Telemetry)

11. Meter needs to be able to record forward and reverse flow.

PSL10 SURFACE BOXES AND VALVE BOXES

PSL10.1 CAST IRON SURFACE BOXES

Surface boxes, covers and frames of cast iron for valve chambers shall comply with the requirements of SABS 558.

PSL10.2 STEP IRONS

Step irons shall comply with the requirements for malleable cast iron of BS 1247, figure1 and shall be fully coated with a high density polypropylene cover. The length of the step irons shall be suitable for fixing in brickwork or in situ and precast concrete.

PSL10.3 PRECAST CONCRETE CHAMBERS

Precast concrete chambers shall consist of reinforced concrete chamber sections of circular shape, manufactured in accordance with the requirements of SABS 677 with the following minimum wall thickness:

<u>Nominal diameter (mm)</u>	<u>Wall thickness (mm)</u>
750	60
1 000	65
1 250	75
1 500	90

The circular chamber sections shall be firmly embedded into a class 20/19 MPa cast in situ foundation as specified on the drawings.

The chambers shall be fitted with a precast reinforced concrete slab of thickness not less than 150 mm or as specified on the drawings.

All joints will be sealed with “Prostruct 687” or “Araldite BV1057” epoxy sealant.

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PSL11 JOINTING

PSL11.1 FLANGED CONNECTIONS

PSL11.1.1 Flanges

All flanges shall be to SABS 1123 and drilling to Table 1600/3 unless otherwise specified.

PSL11.1.2 Bolts and Nuts

Bolts and nuts (GR4.6) shall be coarse pitch thread with hexagonal head in accordance with the requirements of SABS 136 and shall be hot –dipped galvanised to SABS 763, 6HZe. All bolts must be of equal length and the length of each bolt shall be such that, after the nut has been tightened, the end of the bolt shall project above the nut by not less than one full thread and not more than four threads.

PSL11.1.3 Flange gaskets

All gaskets for flanged joints shall be 3 mm thick, full face rubber insertion in accordance with the requirements of BS 3063.

PSL11.2 FLEXIBLE COUPLINGS

All flexible couplings for plain-ended steel pipes and fittings shall be of the slip-on type without centre register, such as Viking Johnson or an approved similar product, and shall comply with the relevant requirements of BS 534.

PSL12 CORROSION PROTECTION

The corrosion protection specified hereafter applies to all surfaces (internal and external) unless otherwise stated.

PSL12.1 STEEL PIPES AND SPECIALS

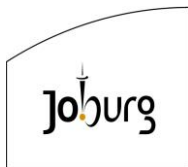
PSL12.1.1 Steel pipes and fittings up to and including 50 mm nominal diameter shall be hot-dipped galvanised to the requirements of SABS 763, unless otherwise specified.

PSL12.1.2 Steel pipes and specials over 50 mm nominal diameter shall receive the following corrosion protection:

a) Surface preparation

Surfaces to be treated shall have all projections, sharp edges, laminations and tool marks removed to provide a smooth surface and shall be cleaned in accordance with section 2, 3 and 4 of SABS Code of Practice 064 to meet the following requirements.

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- (i) A cleanliness of not less than Sa 2½ when tested according to SABS test method 767.
- (ii) A surface profile not exceeding 0.09 mm when tested according to SABS test method 772.
- (iii) Free from dust and debris not more than 0.2 % when they are tested according to SABS test method 769.

The Contractor shall furnish the *Project Manager* with the manufacturer's written warranty that the above requirements have been met.

b) Coatings and Linings

Epoxy coatings and PIB linings shall be applied to the surfaces as specified strictly in accordance with the manufacturer's instructions and shall comply with the requirements of SABS 1217/CITWIF.

The *Contractor* shall furnish the *Project Manager* with a certificate which confirms that the coatings and linings have been applied to the manufacturer's satisfaction. Such certificate shall be signed by the manufacturer and the *Contractor*.

The lining/coating system to be used will consist of the following as specified on the drawings:

- (i) Internal lining:
Solvent Free Epoxy (SANS 1217) with target thickness (dft) of 500microns and (+ 100micron max.)
- (ii) External coating for buried pipework:
Polyisobutane Visco (PIB) Elastic System with target thickness of 2300 microns (± 100micron max.)
- (iii) External coating for above ground pipework:
Layer 1: Polyisobutane Visco (PIB) Elastic System with target thickness of 2300 microns (± 100micron max.)
Layer 2: Top coat layer of re-coatable polyurethane paint with target thickness of 50microns (± 10microns max.) according to Joburg Water colour code for Waterworks.

c) Inspection of epoxy coatings

After completion of lining and coatings in the factory, the steel pipes and specials shall be inspected by an independent Inspector appointed by the Engineer to confirm the integrity of the coatings as specified. No steel pipes and specials may be delivered to site until such time that the coating system has been inspected and approved in writing by the Engineer.

d) Protection, Handling, Transport and Storage of Shop Lined, Coated Pipes and Specials

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After the linings and coatings have passed all inspections and tests, all ends shall be covered and kept covered up until the installation of the pipe or special in the field. End covers shall consist of heavy gauge plastic sheeting or other approved material lapping the ends of the pipe and secured to the outside of the pipe with flat steel binding strips. A single 100 mm long slit shall be cut in the centre of each of the two end covers of each pipe special. End covers to branch ends shall not be slit.

Lined and coated pipes and specials shall be protected against damage at all stages from manufacture to delivery and laying. End covers shall be maintained until ends are jointed. Pipes and specials shall be lifted only by means of broad band slings. During transport pipes and specials shall be supported on padded cradles or saw dust filled bags. Under no circumstances shall coated pipes and specials be placed directly on the ground or unpadded hard surfaces.

PSL12.2 CAST IRON VALVES AND FITTINGS

An epoxy coating system as specified in clause PSL12.1.2 above.

PSL12.3 FLEXIBLE STEEL COUPLINGS

An epoxy coating system as specified in clause PSL12.1.2 above.

PSL12.4 BOLTED OR SCREWED CONNECTIONS BELOW GROUND SURFACE

Bolted connections (flanges and flexible steel coupling) or screwed connections buried below ground surface shall be protected by wrapping petrolatum impregnated cloth tape around the complete connection after installation.

PSL12.5 GALVANISED PIPES AND FITTINGS BELOW GROUND SURFACE

Galvanised pipes and fittings buried below ground surface shall be protected by wrapping petrolatum impregnated cloth tape around the full perimeter of the pipes and fittings to a distance of 100 mm above ground level.

PSL12.6 CAST IRON COVERS AND FRAMES

Cast iron covers and frames shall be painted with black epoxy-tar paint conforming to the requirements of SABS 801 Type 111 and shall be applied in two coats each with a dry film thickness of 250 micron.

PSL12.7 MILD STEEL LIDS AND FRAMES (NOT GALVANISED)

Mild steel lids and frames shall be provided with two coats of epoxy paint to a total minimum dry film thickness of 250 micron, unless otherwise specified.

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PSL13 CONSTRUCTION

PSL13.1 PIPE COVER

The minimum cover of the soffit of pipe couplings shall be 1 000 mm or as otherwise specified. The markings on pipes shall be visible from above after installation.

PSL13.2 MARKER BLOCKS AND MARKERS

Marker blocks and markers indicating the position of pipes and valves shall consist of precast sections of kerbs with a 100 mm high x 75 mm wide x 6 mm deep letter “W” (water main) and/or “V” (valve) recessed into the concrete during manufacture. In cases of existing kerbs, the letter shall be cut into the concrete in a clear legible mark or sandblasted with a template.

PSL14 MEASUREMENT AND PAYMENT

PSL14.1 MATERIALS AND INSTALLATION

The Contractor will be responsible for measuring the actual lengths of pipeline to be constructed and number of fittings to be installed prior to ordering of materials. Payments will be done for actual work done and materials installed and not in accordance with the quantities as scheduled.

PSL14.2 JOINTING

No separate payments will be made for jointing materials and the cost thereof shall be deemed to be included in the rates Contracted for the material or component jointed unless specified otherwise.

PSL14.3 CORROSION PROTECTION

No separate payment will be made for jointing materials and the cost thereof shall be deemed to be included in the rated Contracted for the materials to be corrosion protected.

PSL14.4 MARKER BLOCKS AND MARKERS

Markers shall be measured by number extra over the rate Contracted for kerb units.

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D. PARTICULAR SPECIFICATIONS

The following Particular Specifications are included

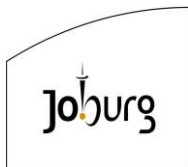
PE : ELECTRICAL SPECIFICATIONS

PG : GENERATOR SPECIFICATION

PP : PUMP SPECIFICATIONS

PR : REHABILITATION OF CONCRETE STRUCTURE OF EXISTING TOWER

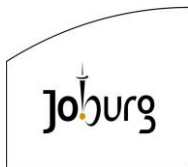
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QUALITY SPECIFICATION FOR ELECTRICAL WORK
FORREST HILL PUMP STATION
INDEX

Paragraph No.	Description
1.	Requirements of the Quality Specification
2	General Electrical Network Requirements
3.	Detailed Specification

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PART 1

1. REQUIREMENTS OF THE QUALITY SPECIFICATION

1.1 SCOPE

This quality specification describes the standards of the materials required for this electrical installation and general methods of installing these materials and is the basis of the quality control requirements. It complements the bill of quantity, the drawings and the detailed specification for the specific contract. Where the detailed specification and/or the drawings differ from this quality technical specification, the detailed specification and the drawings shall take precedence.

This contract shall allow for the supply, delivery on site, complete installation, testing and handing over in working order of the Electrical Services Installation for Forrest Hill Pump Station. Bidders must satisfy themselves that they are fully aware of the contents of this quality specification conditions of contract, and the detail specification, schedules and drawings issued for this contract.

If the Bidder has any doubt as to the meaning of any portion of these conditions or of the specification, etc he shall submit such doubts to the Employer's Agent in writing, in order that they may be removed before submission of the Bid.

Claims originating from non-compliance with the above requirements will not be considered after the closing of Bids.

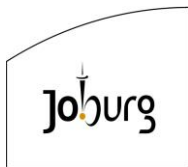
The words "Main Contractor", "Building Contractor" or "Builder" in this document shall mean the Principal Contractor and the words "Electrical Contractor" or "Contractor" or sub-contractor shall mean the sub-contractor appointed for this project.

1.2 REGULATIONS

The complete installation shall be constructed in compliance with the latest editions and revisions of the following regulations:

- a) The Occupational Health and Safety Act (Act No 85 of 1993)
- b) The By-Laws and any other special requirements as laid down by Johannesburg Water.
- c) The standards and design guidelines of City Power
- d) The Local Fire Regulations.
- e) The regulations of the Department of posts and Telecommunications.
- f) The Code for the Wiring of Premises as issued by the SABS. (SANS 01042).
- g) The applicable SANS or BSS specification for particular materials or equipment.
BSS specifications shall only be applicable where SABS specifications are not obtainable for such applications. In the case of conflict between this specification and the above-mentioned regulations and laws, the matter shall be referred to the Employer's Agent, in writing, for a final

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decision. Claims originating from non-compliance with the previous paragraph will not be considered after the closing of Bids.

1.3 DRAWINGS

The Employer's Agent's drawings covering the new installation are available on request. The working drawings applicable to this contract shall generally, consist of :

- a) The Electrical Engineer's drawings which shall be referred to:
- b) The Structural Civil Engineer's drawings.
- c) Drawings of the water reticulation system.

Approval of working drawings of equipment, by the Employer's Agent will not exempt the Electrical Sub-contractor from his liabilities in terms of any requirement of this contract document unless the Electrical Sub-contractor had advised the Employer's Agent, in writing, at the date of handing in of such drawings or samples, of the nature of the deviations from the contract requirements and had received approval for such deviations, in writing, from the Employer's Agent.

Approval of drawings or samples by the Employer's Agent shall also not condone the omission from, or fault in, such drawings or samples.

A complete set of drawings will be handed to the Electrical Sub-contractor during the course of construction of the project for the purposes of marking up of such drawings, by the Electrical Sub-contractor, to supply the Employer's Agent with a set of "as built" drawings on completion of the contract. This requirement is a precondition for acknowledgement of completion.

1.4 NOTICE

The successful Bidder for this contract shall, immediately after he has been officially notified that his Bid has been accepted, and at any time thereafter as may be necessary, notify the Supply Authority, pay fees and take any other steps which may be required or prescribed for the power supply connection and/or temporarily connection by the Supply Authority, to this project.

1.5 MATERIALS

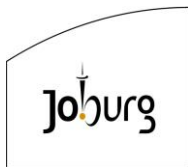
Where a certain manufacturer's material or apparatus are mentioned in the drawings or specifications, such materials or apparatus shall be provided as specified, except where an alternative to this condition is allowed in the specifications and is approved by the Employer's Agent. Where a for material or apparatus is not provided, it shall be understood that all normal requirements for the use of such material or equipment shall apply.

Where certain products of a specified manufacturer are unobtainable, substitutes may be offered, but shall only be supplied after written consent has been given by the Employer's Agent.

All apparatus, components, fittings and material supplied and/or installed, whether expressly specified herein or not, shall conform in respect of quality, manufacture, tests and performance, with the requirements of the South African Bureau of Standards and/or the appropriate current "British Standard Specifications and Addenda thereto", except where otherwise specified or permitted by the Employer's Agent in writing.

The Employer's Agent may order the elected contractor to supply and/or deliver and/or install any other make or manufacture of article(s) than that/those for which the contractor Bided. The unit total cost of

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UPGRADE (FOREST HILL TOWER AND PUMP STATION),
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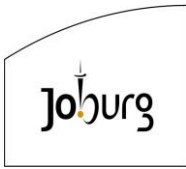
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such item(s) taken out, shall then be subtracted from the Bid sum of the contractor and the unit total of such other apparatus, component parts fittings and/or materials, with which these are replaced, if any, shall be added to the Bid price.

The prices of such items added or omitted shall be calculated by using the current general wholesale prices at which the Electrical Sub-contractor can buy such equipment. The Employer's Agent decision for the determination of such prices shall be final.

Installation work which has been started with certain materials and/or equipment shall be completed by using the same manufacture of articles or equipment throughout the whole project, for that specific application, unless specified otherwise.

Employer:		Contractor:	
Witness:		Witness:	

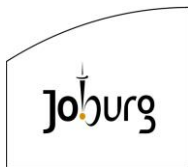


PART 2

2. GENERAL ELECTRICAL NETWORK REQUIREMENTS

(Available on request)

Employer:		Contractor:	
Witness:		Witness:	



PART 3

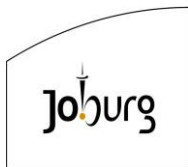
FORREST HILL PUMP STATION

ELECTRICAL INSTALLATION

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FORREST HILL PUMP STATION

PART 3

ELECTRICAL INSTALLATION

3.1 GENERAL SPECIFICATIONS

3.1.1 Johannesburg Water : Electrical Standard Specifications

3.1.2 Department of Public Works : Republic of South Africa Standard Electrical Specifications:
Section B : Installation Specifications.

Section C : Quality specifications for materials and equipment of electrical installations.

3.2 GENERAL INFORMATION FOR THE SUB-CONTRACTOR

3.2.1 SCOPE OF THE SUB-CONTRACT

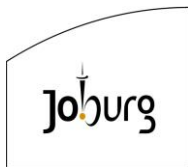
This sub-contract covers the supply, delivery to site, storage on site when required, installation and maintenance of all material and equipment required for the electrical supply to and electrical installation for the Forrest Hill pump station as detailed in the specification and the accompanying drawings.

The installations will consist of the following:

- i) Installing of new main supply cable and feeder circuit breaker.
- ii) Installing of new emergency supply generator
- iii) Low voltage power and control cabling. (Pumpstation and both towers)
- iv) Cable tray installation. (Pumpstation and both towers)
- v) General power and lighting installations. (Pumpstation and both towers)
- vi) Earthing of the installations.
- vii) Motor control centre.
- viii) Instrumentation and control cabling.
- ix) Installing telemetry system for communication with Johannesburg Water control room-Telemetry and instrumentation cable by Johannesburg Water approved contractor.
- x) Disconnecting, removal and making safe of existing electrical installation in existing pump station.
- xi) Connecting of emergency generator.
- xii) Cable sleeve pipe and manholes for telemetry installation.
- xiii) Complete commissioning.

Abovementioned is just a brief description of the project. For a detailed description of the project the contractor must refer to the specification, drawings and Bills of Quantities for electrical work.

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3.2.2 ELECTRICAL CONNECTION

- a) A new 400V supply to the existing pump station will be obtained from the existing LV distribution panel supplied from City Power. A new feeder circuit breaker must be installed to protect the new cables.
- b) The existing 400V supply cable will remain the power source for the old pump station until the change over to the new pumpstation takes place.
- c) The existing pump station must be kept operational while the new pump station is constructed. The new pump station must be made operational before the old pump station is disconnected.

3.2.3 TECHNICAL REQUIREMENTS OF THE INSTALLATION

3.2.3.1 GENERAL

Over and above the equipment specified in this Specification the Contractor must supply and install equipment and auxiliary equipment which he may consider necessary for the proper operation of the complete Electrical Installation to fully comply with the requirements of this Specification.

3.2.3.2 SERVICE CONDITIONS

All equipment and material must be rated for operation under the following Conditions:

Electrical

Voltages	:	LV	-	400/230V
Frequency	:	50Hz		
Phases	:		3	

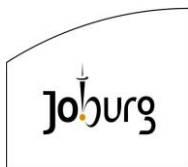
Environment

Altitude	:	1730m		
Average maximum temperature	:		40° C	
Average minimum temperature	:	-10° C		
Average relative humidity	:	80% at 35° C		
Lightning	:	Severe		
Dust	:	Severe		

3.2.4 QUALITY CONTROL

The Contractor must maintain adequate and effective quality control standards while manufacturing the specified equipment. Employer's Agent will have the prerogative of inspecting the equipment in the Contractor's factory at any reasonable time to ensure accuracy of dimensions, completeness, configuration, quality of workmanship, correct identification, proper use of and type of materials, equipment used and finishes to equipment.

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If required the Contractor must provide the Employer's Agent with equipment and facilities to examine the equipment and if necessary test this equipment to preclude malfunctions of the equipment.

3.2.5 RELIABILITY AND MAINTAINABILITY OF EQUIPMENT

The equipment used in the installation must be new and of good commercial quality, having good reliability and must be selected for ease of maintenance.

The requirements must be considered in the Contractor's approach to the interpretation of the Employer's Agent design and may be subject to approval by the Employer's Agent, following demonstration of the equipment's capability by the Contractor

3.2.6 COMMISSIONING AND ACCEPTANCE TESTS

3.2.6.1 SCOPE

This specification covers the requirements for successful commissioning of the Works and performance of acceptance tests.

3.2.6.2 GENERAL

Commissioning procedures as stipulated by the suppliers of equipment must at all times be strictly adhered to.

The commissioning of specialised equipment must be undertaken by the supplier or an approved specialist.

All safety protection systems must be fully commissioned and set points properly checked out and adjusted, before equipment must be allowed to run for commissioning purposes.

The Contractor must assist the Employer's Agent during any test carried out and must supply all tools and instruments necessary for testing purposes.

The Contractor must ensure that the installation is correct, complete and to specification before calling for the Employer's Agent attendance at commissioning or acceptance tests. No last-minute repairs or installations shall be done by the Contractor on the day of inspection/acceptance tests. The cost of any abortive inspections, where the Employer's Agent is called to site, but finds the Contractor ill-prepared for it, will be deducted from the Contract price by variation order. In such instance, the Employer's Agent's or his representative's time will be taken at the SAACE published time rate.

The times and dates for tests and inspections must be agreed to by all parties concerned, after receipt by the Employer's Agent of the Contractor's written application for such tests to be witnessed or inspections to be held.

The Contractor must provide a competent person to accompany the Employer's Agent, or his representative, during all inspections/tests. This person must be fully conversant with the installation. He shall be in a position

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to accept and carry out instructions and must take notes during inspections, ensuring that remedial work can commence immediately.

3.2.6.3 WET COMMISSIONING

On completion of mechanical and electrical erection and as soon as water is available and other circumstances permit, the contractor must arrange for the commissioning of the pumping plant in the presence of the Employer's Agent. The Contractor must ensure that his equipment is suitably prepared before giving the Employer's Agent fourteen days' notice in writing of the date of wet commissioning.

Before the Wet Commissioning, the Contractor must satisfy himself and subsequently prove to the Employer's Agent that all monitoring and operating equipment are functioning correctly.

Wet commissioning must comprise the operation of all plant by the Contractor for such time as is necessary to put all components and equipment into proper adjustment and working order, as well as to calibrate any equipment requiring such attention and to coach operators in the proper operation of the plant. During this period the Contractor must eliminate all causes of problems and rectify any malfunction.

On the day of Wet Commissioning, before commencement of commissioning, the Contractor must hand over to the Employer's Agent the entire three sets of Operating and Maintenance manuals, in full format as specified (**including the quick reference guides as specified**). Failure to comply, will be just cause for the Employer's Agent to declare an abortive inspection and postpone all commissioning.

After wet commissioning, the plant must be run under approved supervision for 100 hours or one calendar month, whichever is the soonest, before the Acceptance Test may be conducted. Upon wet commissioning, the Contractor must satisfy himself that the operators are in a position to operate the plant safely and correctly, should he be absent from Site during this period.

3.2.6.4 ACCEPTANCE TESTS

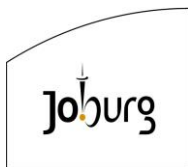
The Acceptance Tests will be performed only if and when:

the plant have been run under approved supervision for 100 hours or one calendar month, whichever is the soonest, **and** every item of the whole Contract is fulfilled for the purpose for which it is intended.

Only when the results of the Acceptance Tests, recorded in a report prepared and submitted by the Contractor, have been found by the Employer's Agent to be satisfactory, the Employer's Agent will certify that the Works have passed the Tests on Completion in issuing the "Taking-Over Certificate".

The "Defects Liability Period" commences on the date of issue of the

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“Certificate of Completion” for the project.

3.2.6.5 TEST EQUIPMENT

Properly calibrated standard test equipment must be supplied at the factory of the Contractor and on site to complete the tests to comply with the final acceptance test plan.

The Contractor must supply all the necessary temporary cables and interconnecting wires in the factory for completing the test plan in the factory.

3.2.7 TERMINOLOGY

The function of and positions to which equipment is connected shall be indicated on the boards. All equipment shall be fitted with identification labels similar to the type specified in Part 2.1. Terminology shall be in "ENGLISH".

3.2.8 AS BUILT DRAWINGS

On completion the Electrical Sub-contractor must provide the Employer's Agent with one complete set of "As Built" drawings. These drawings must show the exact installation as finally completed.

For this purpose the Contractor can obtain CAD drawings from the Employer's Agent. The Contractor must use the same List of Symbols, etc., used by the Employer's Agent. Only drawing work conforming with the latest drawing office practice will be accepted.

3.2.9 OPERATING AND MAINTENANCE MANUALS

3.2.9.1 GENERAL

Three sets of Operator's Manuals must be handed to the Employer's Agent prior to commissioning of the plant. The manuals must be neatly bound, in typewritten and/or printed format, indexed, with appropriate dividers between each section to facilitate ready reference. The format must be A4. All documentation must be presented in the English language.

3.2.9.2 REQUIREMENTS

Each operator's manual must have an index and must contain the following:

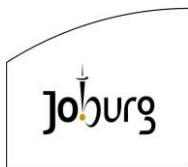
a) **DESCRIPTION OF THE SCHEME**

General description of the scheme, the works and its relation to the scheme as a whole.

b) **DESCRIPTION OF EQUIPMENT**

i) Technical details of all equipment installed.

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- ii) Spares lists with addresses of manufacturers and suppliers.
- iii) Commissioning data of all equipment and systems, indicating in tabulated format the design requirements and actual measured performance. Operating points for pump to be indicated on performance curves.

c) **DETAILED OPERATING INSTRUCTIONS**

- i) Pre start-up checks.
- ii) Start / stopping procedure (Manual and Auto operation).
- iii) Emergency shut-down procedure.
- iv) Routine running attention.
- v) Stopping the plant.
- vi) Prolonged shut-down of the plant.
- vii) Re-commissioning of the plant after repairs, maintenance or prolonged shut-down.

d) **ABBREVIATED OPERATING INSTRUCTIONS**

This will comprise of abbreviated format of the operating instructions, consisting of 2 x A4 pages placed back-to-back in a laminated plastic folder, sealed waterproof.

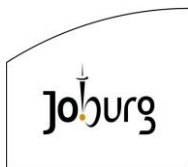
e) **MAINTENANCE**

- i) Routine maintenance procedures
 - a) Description.
 - b) Schedule comprising detailed daily, monthly, 3-monthly, 6-monthly and annual preventative maintenance instructions.
- ii) Preventative maintenance

f) **FAULT FINDING PROCEDURES**

- i) Electrical faults (motor and control gear).
- ii) Instrumentation faults.
- iii) Investigation procedure for detection of motor faults and remedies
 - a) Symptom

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- b) Probable fault
 - c) Remedy
- iv) Investigation procedure for detection of instrumentation faults and remedies
 - a) Symptom
 - b) Probable fault
 - c) Remedy
- g) **SAFETY PRECAUTIONS**
 - i) Hazards, in tabulated format indicating:
 - a) The nature of each hazard
 - b) The level of seriousness
 - c) How to avoid the hazard
 - d) The possible consequences of not avoiding the hazard.
 - ii) Where required by the Occupational Health and Safety Act (No. 85 of 1993), the Contractor must provide all charts and log books properly bound and identified in such a manner that is acceptable to the Inspector.
- h) **“AS BUILT” DRAWINGS**

All drawings must be folded and bound in A4 format, displaying the title and plan number of the cover section.
- i) **MEASUREMENT AND PAYMENT**

Payment will include full compensation for the supply of five sets of Operator's Manuals and as built drawings as specified hereinbefore.

3.3 CABLES

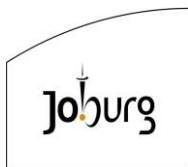
3.3.1 GENERAL

- a) The Contractor must supply and install all the necessary cables as required by this document and shown on the drawings.

NB. All cables must have the SABS mark of approval and must be manufactured in the Republic of South Africa.

- b) All cables must be halogen-free distribution cables.

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3.3.2 LOW VOLTAGE (LV) CABLES

3.3.2.1 Specification

a.	Specification	:	SANS 1507
b.	Maximum permissible operating voltage	:	600/1000V
c.	Conductor material	:	Copper only
d.	Type of insulation material	:	PVC
e.	Armouring	:	SWA (ECC)
f.	Sheath material	:	PVC
g.	Conductor cross sectional area	:	Various (Refer to Bill of Quantities).

3.3.2.2 L V Cable Joints

Joints in L V cables will only be allowed when specifically approved by the Employer's Agent. If joints are made, it must be done in accordance with the General Technical Specification.

3.3.3 INSTRUMENTATION CABLE

a) General

Instrumentation cable must be individually and overall screened type.

MYLAR DEKABON/APL cable must be used with the number of pairs as specified in the cable schedule.

b) Instrumentation Cable Terminations

Pratley Envirogland compression type glands must be used for termination of cables.

c) Instrumentation Cable Joints

No joints will be allowed in instrumentation cable.

3.3.4 CABLE AND SLEEVE PIPE TRENCHES

Refer to the general specification and standard drawings.

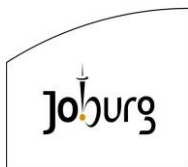
During excavation activities the contractor must properly demarcate and protect all excavations.

3.3.5 EXCAVATION

3.3.5.1 Classification of Material to be excavated:

The Employer's Agent's decision as to in which sub-classification excavated

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materials fall, shall be final.

- a) “Soft and Pickable”. This sub-classification shall include all top soil, sand, loam, clay, gravel, pickable materials, oukclip (laterite), shattered or loose rock, decomposed or partially decomposed rock and all other materials which can be removed with mechanical equipment or by pick and shovel, whether this be by lifting hard layers from underneath or otherwise. Boulders under 0,15 cubic meters in volume are included. The fact that blasting or pneumatic percussion tools or other rock breaking equipment may be a faster or more convenient method of excavating material under this sub-classification shall not entitle the Contractor to claim payment for “rock” excavation.
- b) “Rock”. This sub-classification shall include all solid undecomposed rock, the practical excavation of which necessitates the use of explosives, rock splitting equipment or pneumatic pavement breakers and rock drills. All boulders larger than 0,15 cubic meter in volume are included.

3.3.5.2 **Backfilling of excavations**

a) General

The Contractor will be responsible to dig all cable and sleeve pipe trenches. All cable trenches must be backfilled in 150mm layers to a density of 90% MASSHTO.

b) Road and paved area crossings and sleeve pipe trenches under buildings

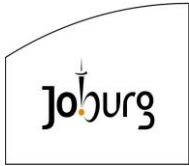
After installation of cable sleeve pipes under roads, paved areas or buildings, the Contractor will be responsible for backfilling and compaction of these trenches in 150mm layers. This must be done to the satisfaction of the Employer's Agent to a density of MASSHTO of 90% on bottom layers, 93% for the third layer from the top, 95% for the second layer of the top and 97% of the top layer. The third layer from the top must be of selected sub grade quality, the second from the top layer must be subbase quality and the top layer base course quality or alternatively the three top layers can be stabilised with 7% cement and compacted to the required densities. All tests to prove the density of layers will be for the account of the Contractor.

All cable trenches must be excavated in the positions shown on the drawings. All cables must be installed at a depth of 1,0m for MV cables and 600mm for LV cables.

There are existing services in the areas where the cable trenches must be excavated. The contractor must take care not to damage these services.

It is the responsibility of the Contractor to obtain the drawings showing

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other services. Any damage to these services will be for the Contractor's account.

The bottom of the trenches must be even and must follow the contour of the natural ground level.

3.4 GENERAL ELECTRICAL INSTALLATION IN BUILDINGS

3.4.1 CONDUIT

Only screwed or plain ended galvanised steel conduit carrying the relevant SABS mark of approval will be accepted except where specifically specified to the contrary. Conduit must be surface mounted on spacer bar saddles against walls and concrete slabs.

All conduit accessories must be galvanised.

The conduit for lighting circuits and 15A single phase switched socket outlets must be 20mm diameter.

3.4.2 DISTRIBUTION BOARDS

a) DISTRIBUTION BOARD PUMP STATION (DB-1)

- General

Type : Surface mounted.

Colour : Electric orange

Fault rating of
equipment : 6kA

- Equipment

- 1 x 80A 3 pole isolator as main switch.
- 1 x 63A single pole plus neutral earth leakage isolators as sub-mains for circuits for switched socket outlets.
- 1 x 63A three pole plus neutral earth leakage for welding socket outlet.
- 1 x 60A three pole circuit breaker for welding socket outlet.
- 3 x 20A single pole circuit breakers for switched socket outlet circuits.
- 2 x 20A three pole circuit breaker for switched socket outlets and lights in two x water towers.
- 2 x 20A single pole circuit breakers for light circuits.
- 1 x 30A single pole circuit breaker for supply to sump pump.
- 1 x External lighting control consisting of:
10A single pole circuit breaker as supply to external lights and time switch.
- 1 x 24hr time switch with 24hr reserve for control of lights.

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18 x Spare spaces for single pole circuit breakers.

b) DISTRIBUTION BOARD GENERATOR ROOM (DB-GR)

- General

Type : Surface mounted.

Colour : Electric orange

Fault rating of
equipment : 6kA

- Equipment

1 x 80A 3 pole isolator as main switch.

1 x 60A single pole plus neutral earth leakage isolator as sub-main for
circuits for switched socket outlets.

1 x 63A three pole plus neutral earth leakage for welding socket
outlet.

1 x 60A three pole circuit breaker for welding socket outlet.

3 x 20A single pole circuit breakers for switched socket outlet circuits.

2 x 20A single pole circuit breakers for light circuits.

2 x 20A 3 pole circuit breakers for existing circuits.

2 x 20A 1 pole circuit breakers for existing circuits.

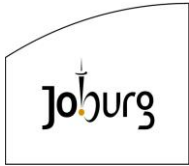
12 x spare spaces for single pole circuit breakers.

3.4.3 WIRING OF CIRCUITS

The following wiring must be used for wiring of the various circuits in the buildings:

- lighting circuits : 2,5mm² PVC insulated live conductor
2,5mm² PVC insulated neutral conductor
2,5mm² bare copper earth conductor
4 mm² for lights in towers due to distance.
- 15A switched socket outlet circuits : 4mm² PVC insulated live conductor
4mm² PVC insulated neutral conductor
2,5mm² bare copper earth conductor
- 30A single phase isolator circuits : 1 x 4mm² PVC insulated live conductors
1 x 4mm² PVC insulated neutral conductor
1 x 2,5mm² bare copper earth conductor
- 30A 3 phase isolator circuits : 3 x 4mm² PVC insulated live conductors
1 x 4mm² PVC insulated neutral conductor
1 x 2,5mm² bare copper earth conductor

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All conductor cores must be ferruled at termination to prevent spreading of conductor strands and subsequent loose connections

3.4.4 LIGHTING

3.4.4.1 GENERAL

Allow for the supply and installation of all the light fittings including the specified lamps.

3.4.4.2 OUTSIDE LIGHTING

Light fittings on the outside of the building must be installed on the outside walls (at the heights specified) as shown on the drawings.

These light fitting must be controlled as indicated on the drawings and described for the distribution boards.

3.4.5 OUTLETS

3.4.5.1 General

Supply and install all the outlet points in the positions shown on the drawings. The conduit installation must be done in accordance with the General Technical Specification.

All heights specified for points is measured from finished floor level to the bottom of the outlet.

All outlet points must be labelled with an engraved label riveted to the cover of the outlet. The label description must include the circuit no and distribution board number.

3.4.5.2 Light Fittings

Conduit for light fittings must be surface mounted in pump stations. Wiring through light fittings will not be allowed. Connection of light fittings must be done as instructed by the Manufacturer of the light fitting.

3.4.5.3 Light Switches

Light switches must be of the industrial type rated at 15A with galvanised boxes and cover plates. Externally mounted light switches must be IP65 classified.

3.4.5.4 Socket Outlets

Socket outlets must be of the industrial type rated at 15A with galvanised

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boxes and cover plates.

3.4.5.5 Local Isolators

Industrial type 2 pole or 3 pole 30A isolators with galvanised boxes must be used.
Externally mounted local isolators must be IP65 classified.

3.4.6 MOUNTING HEIGHTS

The mounting heights of equipment must be as detailed below, unless stated otherwise on the drawings.

ITEM	MEASUREMENT TO CENTRE OF OUTLET BOX FINISHED FLOOR LEVEL
Light switches	1400mm
Socket outlets	1400mm
Local isolator outlets	Refer to drawings
Wall mounted light fittings	Refer to drawings

3.4.7 SCHEDULE OF LIGHT FITTINGS

SYMBOL	DESCRIPTION
L2	LED corrosion proof IP66, 5" 46W Marea luminaire from Lightnet – 4000K
L1	LED NOVA Bulkhead IP65 – 55W 4000K
C	WACO INDUSTRIES type NAVLED 24 VDC with transient protection complete with 1,5m mounting height pole with base plate for bolting to concrete roof. The pole must be hot-dipped galvanised and must be complete with base plate, cable access, access door, gland plate suitable for 2 x 4mm ² 3 core cables, earth stud and wiring to the light fittings (No circuit breaker is required in the pole)
L3	8m poles with 1.5m overhang 45W LED streetlights Beka LEDLume XP1 - 45W LED 7 m MH (6790Lum)

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SYMBOL	DESCRIPTION
L4	High Mast light for area lighting 20m (6 x 200W) LED flood lights

NOTES:

1. All light fittings must be supplied complete with lamps and control gear which must be SANS approved.
2. Similar light fittings to be approved in writing by Engineer before tender closing.

3.5. PUMP STATION INSTALLATION

3.5.1 MOTOR CONTROL CENTRE 1 (MCC 1) (PUMPSTATION)

3.5.1.1 GENERAL

- a) The motor control centre must be constructed according to this Specification.
- b) The motor control centre must be floor standing with bottom and top entry of cables. The control centre will be installed over a cable trench with front access only.
- c) Motor control centres must be designed for a symmetrical fault rating of 35kA.
- d) Layouts of motor control centre supplied with tender drawings are suggestions only. The contractor is required to provide final layouts to suit the application of the MCC and equipment sizes (refer to "Workshop drawings").
- e) The MCC must be designed to fit into the space available on site and must be sized to be manoeuvrable on site without the use of lifting gear.
- f) All motor protection circuit breaker, starter and protection device combinations must provide type 2 co-ordination as defined by IEC 947.
- g) The external colour of the MCC must be electric orange.
- h) All control circuits to be 230V.
- i) All indication and pilot lights to be of the LED type rated for the control voltage.
- j) All terminals must be of the "Disconnect blade terminal with test socket" type.

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- k) The design of the MCC, central systems etc. must be for 3 pumps only but a spare, unequipped, cubicle in the MCC should be provided for future use.

3.5.1.2 DESCRIPTION OF EQUIPMENT FOR MOTOR CONTROL CENTRE

ITEM	QUANTITY OF CUBICLES	DESCRIPTION
1	1	Main incomer cubicle consisting of: 1 x 800A adjustable incoming main circuit breaker with door interlock, shunt trip facility and auxiliary contacts wired to terminals on marshalling cubicle (Adj to 700A) 1 x 1000mA core balance earth fault protection device with a 250 ms time delay 4 x surge arrestors 3 x current transformers and Schneider PM 5560 power meter or equivalent approved 3 x fuses for voltmeter circuit 1 x digital voltmeter for phase voltages with 4–20mA outputs per phase wired to terminals on marshalling cubicle 1 x set of interlocking facilities
2	1	Busbar compartment over the full length of the panel consisting of: 3 x 800A rated busbars, one for each phase 1 x 800A rated neutral bar 1 x 800A rated earth bar

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3	3	Cubicle for pumps no 1, 2 and 3 each consisting of: 1 x control circuit breaker with shunt trip facility. 1 x digital hour meter indicating running time of each pump Hour meters should have internal battery storage for 24 hours. 1 x set of fuses and phase sequence, phase failure, over voltage and under voltage monitor wired to shunt trip and to marshalling cubicle 1 x motor protection circuit breaker for 110kW motor lockable in the "Off" position with varidepth handle and door interlock, shunt trip facility and auxiliary contacts wired to marshalling cubicle 1 x VSD rated for the motor with door mounted HMI. HMI to provide visual representation and overview of pump set with all alarms, trips, pressures and indications displayed. 3 x current transformers and digital ammeter with door mounted display and 4–20mA output per phase wired to marshalling cubicle 1 x set of START, STOP and RESET push buttons 1 x set of terminals and control wiring for remote emergency stop. 1 x set of terminals for control and signal cables 1 x set of indication lights for: - PUMP RUN - PUMP TRIPPED - CIRCUIT FAULT - FAULT - SUCTION SIDE NO FLOW - DELIVERY SIDE NO FLOW 1 x emergency stop button mounted on panel 1 x set of cooling fans for VSD 1x vibration monitor (for pump and motor) wired to terminals for alarm in marshalling cubicle and for trip to VSD (Temperature probes to be PT100 type or equivalent). 1 x bearing temperature monitoring relay (for both pump and both motor bearings) with alarm and trip contacts. Alarm contacts to be wired to terminals in marshalling cubicle and trip contracts to be wired to VSD (Temperature probes to be PT100 type). 1 x temperature monitoring relay for pump volute casing temperature monitor with alarm and trip contacts. Alarm contacts to be wired to terminals in marshalling cubicle and trip contacts to VSD (Temperature probe to be PT100 type). 1 x input from suction pressure switch with 0-60 seconds adjustable time switch wired to VSD for low suction pressure protection.
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		1 x input from delivery pressure switch with 0-60 seconds adjustable time switch wired to VSD for high delivery pressure protection 1 x winding thermistor relay with alarm and trip contacts. Alarm contacts to be wired to marshalling cubicle and trip contacts to be wired to VSD 1 x isolation key system for lock-out purposes with contact wired to marshalling cubicle.
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4	1	Cubicle for common control of MCC consisting of: 1 x Control circuit breaker. 1 x set of fuses for supply monitor (taken from before main circuit breaker on incomer cubicle) 1 x phase sequence, phase failure, over voltage and under voltage monitor wired to shunt trip supply healthy indication light and marshalling cubicle. 1 x MANUAL/AUTOMATIC selector switch 1 x time switch adjustable from 0-10 seconds for start-up sounder and start time delay. 1 x start-up sounder 1 x set of relays and small wiring for all interlocking between pumps 1 x Duty/standby pump set selection system when AUTOMATIC is selected (refer to operational description). 1 x Set of indication lights for: - SUPPLY HEALTHY. - LOW WATER LEVEL SUPPLY SUMP - FLOOD ALARM - SUPPLY SUMP/SUCTION PRESSURE LOW - PUMP STATION BYPASS SELECTED - TOWER BYPASS SELECTED - SUMP INLET VALVE OPEN - SUMP INLET VALVE CLOSED 1 x door mount ultrasonic level controller for level indication of supply sump. Level controller to be used for dry running protection of pumps, control of motorised inlet valve, alarms and indication. 2 x door mounted ultrasonic level controllers for level indication of water level in each tower. Level controllers to be used for overflow protection, alarms and indication 1 x SUMP BYPASS selector switch. 1 x TOWER BYPASS selector switch. 3 x Input from suction pressure transducer to control system with suitable time delay to allow pressure stabilise at start-up. 3 x Input from delivery side pressure transducer to control system. 1 x Control system to control pump station operation as per operational description. 1 x door mounted HMI for total pump station with modem and data simcard with 2 year subscription for remote supervision and PLC programming. (Specified below)
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5	2	Wireways for incoming control, instrumentation and power cables with suitable no. and rated terminals. Wireways to be shared between PUMP 1 and PUMP2 cubicles and PUMP 3 and common control and local distribution cubicle
6	1	Local distribution cubicle to contain: - 1 x 80A 3 pole main circuit breaker. - 1 x 63A 3 pole circuit breaker as supply to pump station DB 1 - 1 x 40A 3 pole circuit breaker as supply to generator room DB - 1 x 63A 3 pole circuit breaker as supply to gatehouse DB - 1 x 40A 1 pole circuit breaker as supply to telemetry room - 6 x 30A 1 pole circuit breakers as supply to flow meters - 1 x Spare space for future 18 x 20A single pole circuit breakers NOTE: Main circuit breaker to be selected to provide cascade protection for sub-circuit equipment.
7	1	Cubicle to contain DC back-up power system for navigation warning lights consisting of: - 1 x 24V power supply, battery charger and batteries rated to power 4 x navigation warning lights for 24 hours. - 2 x 5A 24V DC circuit breakers as supply to warning lights on towers

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8	1	Marshalling cubicle for interfacing with telemetry equipment with: Digital signals - Mains failure. - Station phase fail. - Pump run (x3). - Pump auto selected. - Pump trip (x3) (from VSD). - Pump phase fail (x3). - Pump set out of service/locked out (x3). - Pump interlocks (x3). - Sump bypass selected. - Tower bypass selected. - Bearing temperature warnings (Motor and pump DE and NDE) (x3 pump sets). - Pump volute casing temperature warnings (x3). - Vibration warnings (motor and pump DE and NDE) (x3 pump sets). - Motor winding temperature warnings (x3 motors). - Flood alarm. - Tower high level alarm (x2). - Tower overflow alarm (x2) - Tower low level alarm (x2). - Generator run. - Generator fault. - Suction side no flow (x3). - Delivery side no flow (x3) - Terminals for 20% spare change-over contacts.
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		Analogue signals - Pump station electrical current. - Ultrasonic level sensor outputs (Towers 1 & 2) - Hydrostatic level sensor outputs (Towers 1 & 2) - Pressure sensor inputs for: • pump suction side (x3 pumps) • pump delivery side (x3 pumps). - Pumps digital monitor input (x3 pumps). - Digital volt meter on incomer. - Digital ammeter on pump supplies (3 pumps) - Terminals for 20% spare signals Modbus communication links - From generator controller. - From VSD (x3). - From power meter on main incoming cubicle. Equipment PLC for pump operation linked to modem for remote programming. • Input from all sensors, VSD's etc • Output start signals for motors when system in Auto mode • Feeds HMI on panel door to provide visual feedback to operator; • Links with modem/router for remote monitoring and management of PLC. 24 Month's subscription to be included for simcard. NOTE : All digital signals to the marshalling cubicle must be potential free change-over contacts
9	1	Horizontal wire way linking cubicles for bus wiring

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3.5.1.3 OPERATION OF MOTOR CONTROL CENTRE

a) GENERAL

- Supply monitor to trip main incoming circuit breaker or pump circuit breaker when supply is not healthy with indication and alarm.
- Pumps 1, 2 and 3 may run simultaneously if water offtake is high.
- When both AUTOMATIC or MANUAL is selected electrical protection, no flow protection and dry running protection must be active.

b) MANUAL CONTROL

- When MANUAL control is selected pump sets must be able to be normally started and stopped from the MCC.
- Up to three pumps should be allowed to run at any time during manual operation.
- All dry running protection, electrical protection and cavitation prevention must be active.
- All VSD protection should remain active.

c) AUTOMATIC CONTROL

CONTROL PHILOSOPHY

The water levels in both the water towers are measured using ultrasonic level transmitters with hydrostatic back-up level sensors providing the final protection to prevent overflow at level “E”. The water level signal is an analogue quantity (4-20mA) which is fed back to a PLC/VSD control circuits to stop/start motor operation.

Definition of Levels and control:

- Level E: Overflow warning signal at actual overflow point;
- Level D: Tower “high level signal” at 100mm below overflow point to stop all pumps;
- Level C: Tower “low level signal” for two x duty pumps to start to be set at 500mm below level D. (2 x 233l/s)
- Level B: Tower “extra low level signal” pump control point at 1m below C. Standby pump no three also starts when this level is reached.
- Level A: Tower low level alarm (3m below B)
- The selection of duty and standby will be applicable and rotate on a 24 hr basis between the three motors so that all will run for similar hours on a month to month basis. *This will be PLC controlled by always allowing motors with the lowest hours’ runtime to start first.*

Protection functions will always override the normal automatic control

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process until conditions have normalised where after it should reset itself.

In the case of a motor pump set not responding to a start signal, the next available motor should be started automatically and the fault condition reported via a visible warning light as well as the telemetry system.

Once level B has been reached the third pump starts up which will result in an overall water flow rate of 3 x 233l/s. The expected average offtake of water from the system is well below this max capability and therefore three pumps should easily fill up water towers during times of peak off-take.

In the case of ultrasonic level sensing failure the pumps should all stop and the condition reported via the remote telemetry system. If, for some reason, the pumps keep on running, the hydrostatic level switch installed on level E should “trip” the supply circuit breaker to the pump station and all should stop.

d) PROTECTION

COMMON CONTROL – SUCTION SIDE

- The suction side pressure transmitters (P1-i, P2-i, P3-i) must provide the input into the control system for the supply pressure status
- An adjustable time delay must be provided to allow the initial negative pressure to stabilise before the pump set is locked out.
- The lock-out must be manually resettable after the valve/s is opened.
- A SUCTION SIDE NO FLOW indication light must be provided.
- The control system must lock-out at a level (in normal operation) and pressure of less than 0.2 bar (suction head) indicating either a closed valve on the input side or low water level to prevent dry running.
- The control system must automatically reset and resume operation when in normal operation the suction head has risen to 0,5 bar.
- A selector switch must be provided on the common control cubicle to select “PUMP STATION BYPASS” with auxiliary contacts for indication.

COMMON CONTROL – DELIVERY SIDE

- The delivery side must be controlled from the pressure transmitters on the delivery sides of each pump (P1-o, P2-o, P3-o).
- The pump set should be protected against a closed delivery valve by stopping the pumps should this occur. Pressure more than 4 bar should indicate a closed valve and the system should restart once it has reduced to 3.5 bar.
- An adjustable time delay must be provided to allow for the initial pressure surge to stabilise before the pump set is locked out.

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- The lock-out must be manually resettable after the valve/s is opened.
- A DELIVERY SIDE NO FLOW indication light must be provided
- A selector switch must be provided on the common control cubicle to select "TOWER BYPASS".

PUMP DUTY SELECTION

The duty pumps must be selected and rotated every 24 hours according to the following table.

TIME	PUMP 1	PUMP 2	PUMP 3
0-24 hr	Duty 1	Duty 2	Standby
24-48hr	Standby	Duty 1	Duty 2
48-72hr	Duty 2	Standby	Duty 1
72 hr onwards	Cycle to repeat		

3.5.1.4 PUMPSET ELECTRICAL PROTECTION

All protection functions as offered by the VSD must be active during automatic control.

3.5.1.5 COMMISSIONING OF MOTOR CONTROL CENTRE

Over and above full factory testing, the tenderer must allow in his price to have the manufacturer of the motor control centre to be present on site for the full time during commissioning of the pump station. The manufacturer must involve the VSD specialist to ensure the correct programming of the system.

3.5.2 INDICATION LAMPS

Only cluster type LED lamps must be used.

3.5.3 FAIL SAFE OPERATION

The MCC must be planned to utilise the use of "Normally closed" contacts on all external connections to allow for the monitoring of the total circuit including control cabling.

3.5.4 SURGE PROTECTION

The contractor must ensure that all components and sub-components of the installation are protected for extreme surge-conditions as prescribed by all component and sub-component manufacturers.

3.6 REMOTE EMERGENCY STOPS (LOCK-OUT STOPS)

Emergency stops must be mounted on/at each motor (refer to detail drawings).

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3.7 CABLE TRAY

Cable tray must be of the O-Line or equivalent type. All cable tray must be constructed from mild steel and must be hot-dipped galvanised to SANS 763.

3.8 PRESSURE TRANSDUCERS

Pressure transducers must be rated for the application and must be complete with the required power supply, must be of rated pressure and operating pressure range for the application and must supply a 4-20mA output for the pump control and telemetry circuits. Pressure transducers to be complete with bleeding valves.

3.9 WATER TOWER LEVEL CONTROLLERS

3.9.1 Ultrasonic level controllers must be the PULSAR ULTRA series suitable for the application.

3.9.2 Hydrostatic level controllers (for telemetry only) shall be Johannesburg Water approved

3.10 PRESSURE SWITCHES

Pressure switches to be of the SAUTTER manufacture suitable for the operating pressure and protection requirements in manual pump operation and as back up during automatic control.

3.11 JUNCTION BOXES

3.11.1 GENERAL

All terminals must be of the “disconnect blade terminal with test socket” type.

3.11.2 PUMP JUNCTION BOXES

Purpose made junction boxes complete with mounting frame and terminals must be installed at each pump set.

3.11.3 PRESSURE TRANSDUCER JUNCTION BOXES

Pratley type utility boxes complete with terminals must be installed at pressure transducers mounted remotely from pump sets.

3.12 FRAMED DRAWINGS

Drawings of the wiring diagrams must be framed behind clear perspex and mounted on the wall in each pump station control room. The following information in respect of commissioned settings must be indicated on these drawings:

3.12.1 Time switches - Type, manufacture and commissioned settings.

3.12.2 Overload protection devices - Type, manufacture and commissioned settings.

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3.12.3 VSD - Type, manufacturer and commissioned settings.

3.12.4 Pressure transmitters – type, manufacturer and commissioned setting.

3.12.5 Ultrasonic level controllers – type, manufacturer and commissioned settings.

3.13 EARTHING

3.13.1 GENERAL

All metal work in the pump station and towers must be earthed to the main earth bar in the MCC via 70mm² conductor (walkways, handrails, pipework, cable trench corner steel work, pump bases etc.).

3.13.2 EARTHING SYSTEM

An earth mat must be installed below the floor of the pump station as indicated and connected to the MCC earth bar.

3.13.3 EARTH CONNECTIONS

All underground earth connections must be by means of hydraulically crimped T-ferules while above ground connections must be via correctly sized hydraulically crimped lugs and bolts and nuts.

3.13.4 EARTH RESISTANCE

The earth resistance of the earth mat must be measured to determine if the resistance is 1 ohm or less. If the resistance is not 1 ohm or less the contractor will be instructed to implement additional earthing measures by the Employer's Agent to reduce the resistance to less than 1 ohm.

3.14 SLEEVE PIPES

Sleeve pipes must be the "Kabelflex" type manufactured by Nextube or equivalent approved.

Long radius bends must be formed by bending the sleeve pipes without the use of specially manufactured bends or fixed bends with long radius suitable for the pipe must be used.

3.15 WORKSHOP DRAWINGS

3.15.1 Workshop drawings of the following equipment must be submitted to the Employer's Agent for approval before manufacturing of equipment commences:

- All distribution boards.
- The motor control centre (MCC).

3.15.2 The drawings must consist of a general arrangement and dimension drawing as well as

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full wiring diagrams.

These drawings must be submitted to the Employer's Agent not later than four (2) weeks after the Contractor has been notified that his tender has been accepted. The Employer's Agent will give his approval/comment within two (2) weeks.

3.16 SITE SECURITY LIGHTS

3.16.1 ACCESS ROAD

3.16.1.1 General

Poles must be designed in accordance with SANS 10255.

Poles must be hot-dipped galvanised steel type complete with a base plate, cable access opening, access opening and door, 5A circuit breaker and cable gland plate with space for 2 x incoming 10mm² 3 core cables and an earth stud.

The access door must have a bolt-on weatherproof cover fixed by means of a bolt with an Allen-key type head.

The hot-dipped galvanising must be done according to SANS 121:2011 specification and must be done by a SANS approved galvaniser.

The Poles must be suitable for use with the type of light fitting specified.

The wiring inside the pole, from the circuit breaker to the light fitting must be included in the pole price.

3.16.1.2 Mounting heights

The mounting height of the pole must be 7,0m (overall length of 8.0m).

A 1.5m overhang is required alternatively as per Johannesburg Water specification.

3.16.1.3 Light Fittings

The access road light fitting must be a BEKA LEDLume XP1 - 45W LED 7 m MH (6790Lum) street light or equivalent complete with lamps, drivers, etc. suitable for connection to a 230V single phase supply.

3.17 EXISTING PUMP STATION

On completion of the new pump station power supply must be changed over from the existing pump station to the new pump station. The electrical installation in the old pump station must

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then be stripped out and made safe to allow the alterations to be done to the old pump station to house the generator.

All existing material must be carefully removed and delivered to the stores of Johannesburg Water.

3.18 INSPECTIONS

The Employer's Agent reserves the right to inspect all equipment at any time during manufacture and to be present at any tests.

3.19 LOW VOLTAGE CABLE AND INSTRUMENTATION CABLE SCHEDULES

3.19.1 SITE RETICULATION AND SITE LIGHTING

FROM	TO	CABLE	EARTH CONDUCTOR
		PVC/SWA/PVC	
City Power Substation	Generator C/O	2 x 185 sqmm x 4C	ECC
Generator C/O	MCC main incomer	2 x 185 sqmm x 4C	ECC
DB GH (Gate house)	Perimeter lighting	6sqmm x 4C	ECC

3.19.2 PUMP STATION AND WATER TOWERS

FROM	TO	CABLE	BCEW
MCC	JB1 (Power)	95 mm ² x 4	50 mm ²
MCC	JB2 (Power)	95 mm ² x 4	50 mm ²
MCC	JB3 (Power)	95 mm ² x 4	50 mm ²
PUMP 1	JB1 (Power)	95 mm ² x 4	50 mm ²
PUMP 2	JB2 (Power)	95 mm ² x 4	50 mm ²
PUMP 3	JB3 (Power)	95 mm ² x 4	50 mm ²
MCC	Emergency Stop 1	1.5 mm ² x 4	None
MCC	Emergency Stop 2	1.5 mm ² x 4	None
MCC	Emergency Stop 3	1.5 mm ² x 4	None
MCC	JB1 (Control)	1.5 mm ² x 12	None
MCC	JB2 (Control)	1.5 mm ² x 12	None
MCC	JB3 (Control)	1.5 mm ² x 12	None
MCC	JB1 (Instruments)	8 x twisted pairs UVG 2	None
MCC	JB2 (Instruments)	8 x twisted pairs UVG 2	None
MCC	JB3 (Instruments)	8 x twisted pairs UVG 2	None
MCC	U/S Flow Meter 1 Tower 1	4 x twisted pairs UVG 2	None
MCC	U/S Flow Meter 2 Tower 1	4 x twisted pairs UVG 2	None
MCC	U/S Flow Meter 1 Tower 2	4 x twisted pairs UVG 2	None
MCC	U/S Flow Meter 2 Tower 2	4 x twisted pairs UVG 2	None
DB1	DB T1- Tower 1	6 mm ² x 3	None
DB1	DB T2- Tower 2	6 mm ² x 3	None

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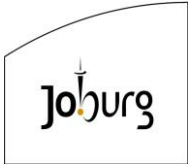
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MCC	Aviation lights Tower 1 DC	4 mm ² x 3	None
MCC	Aviation lights Tower 2 DC	4 mm ² x 3	None
MCC	DB1	25 mm ² x 4	16 mm ²
MCC	DB GR (Generator)	25 mm ² x 4	16 mm ²
MCC	DB GH (Gate house)	25 mm ² x 4	16 mm ²
MCC	Telemetry	6 mm ² x 3	None
DB1	High Mast light	4 mm ² x 4	2.5 mm ²
MCC	JB-Ultrasonic sensor 1 Tower 1	2 x Twisted Pair UVG 2	None
MCC	JB-Ultrasonic sensor 2 Tower 1	2 x Twisted Pair UVG 2	None
MCC	JB-Hydrostat sensor Tower 1	2 x Twisted Pair UVG 2	None
MCC	JB-Ultrasonic sensor 1 Tower 2	2 x Twisted Pair UVG 2	None
MCC	JB-Ultrasonic sensor 2 Tower 2	2 x Twisted Pair UVG 2	None
MCC	JB-Hydrostat sensor Tower 2	2 x Twisted Pair UVG 2	None
MCC	JB-Ultrasonic sensor 1 Sump	2 x Twisted Pair UVG 2	None
MCC	JB-Ultrasonic sensor 2 Sump	2 x Twisted Pair UVG 2	None

3.20 DRAWINGS

- E01 Rev 0 - Site Plan : Main Supply, Lighting, Cable Sleeve Pipes & Manholes.
- E02 - Pump Station Electrical Installation
- E03 - Tower(s) Electrical Installation

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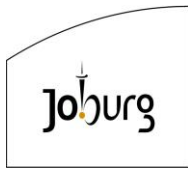
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JOHANNESBURG SOUTH



Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Electrical

PRICED BILL OF QUANTITIES
(INCLUDED IN MAIN CONTRACT BILL)

Employer:		Contractor:	
Witness:		Witness:	



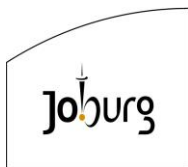
FORREST HILL PUMP STATION PRT PG

PARTICULAR SPECIFICATION FOR GENERATOR INSTALLATION

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Employer:		Contractor:	
Witness:		Witness:	



FORREST HILL PUMP STATION PRT PG

PARTICULAR SPECIFICATION: GENERATOR INSTALLATION

PG1 GENERAL SPECIFICATIONS

Department of Public Works Republic of South Africa Specification for the Supply, Delivery and installation of an emergency generator set:

Section 2	Equipment Requirements
Section 3	Technical Specification

PG2 GENERAL INFORMATION FOR THE SUB-CONTRACTOR

PG2.1 SCOPE OF THE SUB-CONTRACT

This sub-contract covers the supply, delivery, installation and commissioning of one stationary 600 kVA Prime Power rated diesel alternator set at Forrest Hill Pump Station.

Technical considerations concerning the engineering, design, maintenance requirements etc., are of the utmost importance and will weigh heavily in the adjudication of tenders received and tenderers are advised to submit the fullest possible details with their tenders.

This tender allows for the following:

- Providing full workshop drawings of the generator set for approval by the Engineer.
- Providing for suitable louvres (inlet and outlet) to the Main Contractor for the installation of these louvres into the existing pump station building which is to be converted into a generator room.
- Complete installation and commissioning of the new emergency generator set according to the specification including moving of the generator into building, placing it into position and the supply and installation of the radiator air duct.

PG2.2 SITE AND CLIMATIC CONDITIONS

The diesel alternator set to be capable of full rated output under the following prevailing climatic conditions:

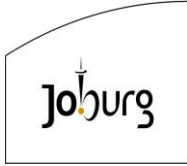
Altitude	1 730
Max.	meters
Temperature	45°C
Min. temperature	-5°C

PG3 GENERAL NOTE

The diesel alternator set called for in this contract will be used as a standby unit for the continuity of supply to the pump station to ensure continuity of water supply by the pump station.

To best serve the purchaser's needs and interests, only tenders on current equipment which can

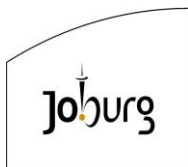
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be properly maintained and serviced without the necessity of the purchaser carrying extensive parts stock or being subjected to the inconvenience of long period of interrupted service due to lack of available parts, will be considered.

Employer:		Contractor:	
Witness:		Witness:	



PG4 OUTPUT OF SET

The set shall have a continuous prime power rating of 600 kVA at 0,8 power factor with the alternator wound for the supply of 400/230 volts, 3 phase, 4 wire, 50 Hz., and running at a speed of 1500 r.p.m.

PGS DIESEL ENGINE

PGS.1 RATING

The specified horsepower rating of the diesel engine shall be the available brake horsepower when the engine is equipped with all the necessary operating accessories such as air cleaners, lubricating oil pump, jacket water pump, charging alternator, governor, etc.

The radiator fan shall also be included as a necessary operating accessory and is to be deducted from the gross horsepower rating. Each tenderer is to furnish the manufacturers specification sheet or certification of engine power output capacity at the engine flywheel.

PGS.2 ENGINE SPECIFICATION

PGS.2.1 TYPE

The diesel engine shall be a full compression ignition, single acting, solid injection unit. It shall be either vertical or "V" type and not less than four cylinders.

PGS.2.2 SPEED

The engine speed shall not exceed 1500 r.p.m. at normal full load operation.

PGS.2.3 GOVERNOR

The unit shall be equipped with a governor capable of providing accurate speed regulation to BS. 649 Class A2.

PGS.2.4 FUEL

The engine shall be capable of the stated performance using diesel fuels normally available in South Africa.

PGS.2.5 FUEL SYSTEM

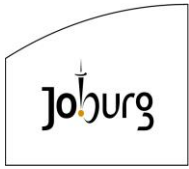
Injection pumps and injection valves shall be of a type not requiring adjustment in service.

The fuel system shall be equipped with replaceable fuel filter elements which may be easily removed without breaking any fuel line connection, disturbing fuel pumps or any other engine part.

PGS.2.6 TRANSFER PUMP

A gear type engine driven fuel transfer pump for supplying fuel through the filters to the injection pumps at constant pressure shall be provided.

Employer:		Contractor:	
Witness:		Witness:	



PGS.2.7 LUBRICATING SYSTEM

A gear type lubricating oil pump will supply oil under pressure to main bearings, crank pin bearings, pistons, timing gear, camshaft bearings and valve rocker mechanism.

Pistons shall be spray cooled.

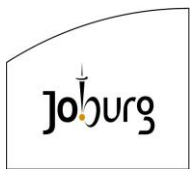
Replacement resin impregnated cellulose type filter elements which provide full flow of lubricating oil shall be provided.

The filter system shall be equipped with spring loaded by pass valve as an assurance against stoppage of lubricating oil circulating in the event of filters becoming clogged.

PGS.2.8 AIR INTAKE SYSTEM

The air intake system to the engine shall be fitted with suitable air filters with dry type replaceable elements and shall be equal or similar and approved to the "Donaldson" system.

Employer:		Contractor:	
Witness:		Witness:	



PGS.2.9 COOLING SYSTEM

The cooling system shall be entirely self-contained, consisting of a radiator, blower fan, circulating pump with thermostatic control.

The radiator and engine cooling system shall be filled with a rust inhibitor solution.

PGS.2.10 EXHAUST SYSTEM

The diesel engine will be provided with a suitable exhaust pipe and residential type exhaust silencer with a flexible inter-connector lagged within the plant room. The complete exhaust system shall be manufactured from stainless steel and all joints shall be flanged.

PGS.2.11 ENGINE PROTECTION

The engine shall be equipped with automatic safety controls which shut down the engine in the event of low lubricating oil pressure, high engine temperature, overspeed and underspeed.

PGS.2.12 INSTRUMENTATION

The following instrumentation is required:

- a. Jacket water thermometer
- b. Lubricating oil pressure gauge
- c. Mechanical hour meter
- d. Charging ammeter
- e. Fuel pressure gauge

PGS.2.13 FUEL TANK

The emergency generator contractor shall allow in his tender price to provide a diesel tank and to install the tank under the generator set as an integral part of the generator set.

The tank shall have a capacity to provide 12 hours standby time at full load.

The emergency generator contractor shall allow for all piping, valves, fittings, pumps, supports, etc to facilitate automatic feeding from the tank to the generator set.

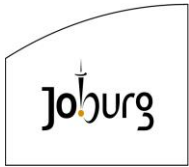
The emergency generator contractor shall allow to install a low level alarm on the tanks to give an audible alarm when the level of diesel in the tank has dropped to 20%.

On completion of installation the diesel tank must be filled with diesel before handing over to the Client.

PGS.2.14 ENGINE BREATHER EXTENSION AND OIL DRAIN PUMP

The Contractor shall provide a suitable engine breather and oil drain extension. The engine shall be equipped with a hand operating drain pump connected to the sump drain plug position for draining of lubricating oil from the sump.

Employer:		Contractor:	
Witness:		Witness:	



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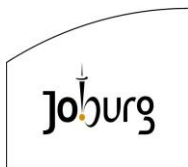
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A drip tray of galvanised sheet metal shall be provided below the engine sump.

PGS.2.15 ENGINE JACKET WATER HEATER

If the engine requires any form of auxiliary heating equipment to ensure easy starting and load acceptance, full details of such equipment shall be submitted with tender.

Employer:		Contractor:	
Witness:		Witness:	



PG6 ALTERNATOR

PG6.1 RATING

The alternator shall generate at 400/230 volts, 3 phase, 50 Hz., and shall be of the drip proof screen protected design rated for the specified kVA output at 0,8 power factor.

PG6.2 CONSTRUCTION

The alternator shall be of the self-regulating type manufactured generally in accordance with BS4999/5000.

PG6.3 EXCITATION

The excitation system shall be such that voltage recovery is rapid and the build-up of voltage from the moment of start shall be sufficient to enable full load to be accepted within 15 seconds.

PG6.4 WAVE FORM

The design shall be such that the wave form of the alternator between phases at all loads approximates closely to a sine curve and the total harmonic deviation should not exceed 5 %.

PG6.5 REGULATION

The alternator output voltage is to be maintained within plus minus 22 % ranging from no load to full load.

PG6.6 RESPONSE

The voltage response of the alternator to transient load changes shall be such that the voltage recovers to within 3 % of the steady state value in 0,3 seconds on application of full rated load.

PG6.7 REGULATOR DESIGN

The regulator shall have the following build in features:

- a. Volts per hertz regulation
- b. Three phase voltage sensing
- c. Inverse time thermal overload protection
- d. Fuse protection for regulator faults

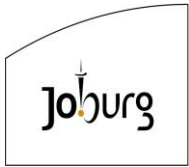
PG6.8 RADIO INTERFERENCE

The alternator shall be suppressed to comply with BSS. 800.

PG6.9 OUTPUT AND TEMPERATURE RISING

The alternator with its exciter shall be capable of running continuously at the rated output required.

Employer:		Contractor:	
Witness:		Witness:	



PG7 STARTING SYSTEM

The unit is to be provided with an electric starting system.

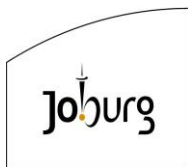
PG8 CHARGING SYSTEM

The unit is to be provided with a charging alternator to keep the batteries in a fully charged condition when engine is running.

PG9 BATTERIES

Starting batteries may be of the lead acid type and complete with battery cables and stand. The batteries shall be suitably rated for starting the engine up to six times in quick succession.

Employer:		Contractor:	
Witness:		Witness:	



PGIO MAINS OPERATED AUTOMATIC BATTERY CHARGER

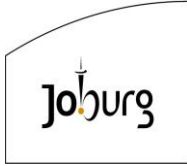
The unit is to be complete with trickle charging equipment energised from a separate 230 volt, 50 cycle AC supply source. The trickle charger should be automatic in operation with High - Low rate trickle charging to maintain the battery at all times in a fully charged condition. This equipment is to be installed in the control panel and complete with volt and ammeter.

PGU AUTOMATIC CONTROL PANEL

The automatic mains failure control panel shall be complete as follows:

- PGII.1 1 - Set mounted dustproof heavy gauge sheet steel cubicle, fitted with hinged doors to provide easy access to all equipment housed inside it. Cable access from the top or bottom of the panel.
- PGII.2 3 - Ammeters, (maximum demand).
- PGII.3 3 - Current transformers.
- PGII.4 1 - Volt meter.
- PGII.5 1 - Volt meter selector switch.
- PGII.6 1 - Frequency meter.
- PGII.7 1 - Moulded case air circuit breaker complete with magnetic short circuit and thermal overload protection for generator.
- PGII.8 1 - Set automatic change-over equipment comprising the following:
"Mains Supplying Load" indication lamp.
"Alternator Supplying Load" indication lamp.
Mains isolator.
Change-over contactor timers.
Set of suitably rated change-over equipment mechanically and electrically interlocked.
- PGII.9 1 - Set suitably rated busbars and load terminals.
- PGI 1.10 1 - Hours run meter.
- PGII.11 1 - Neutral bar.
- PGII.12 1 - Earth bar.
- Battery charger supply circuit breaker.
- PGII.13 1 - Jacket water heater supply circuit
- breaker. Set instrument and control
- PGII.14 1 - fuses.
- PGII.15 1 - Automatic mains failure control panel containing the following equipment which is generally of the easily replaceable, solid state, plug-in module type.
- PGII.16 1 - a. Mains monitoring equipment with adjustable start delay to initiate the starting of the set on failure of any phase or total failure of the normal mains supply.

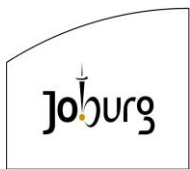
Employer:		Contractor:	
Witness:		Witness:	



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- b. Equipment to give successive engine cranking attempts with a cut out device to inhibit further cranking once the engine has started.
- c. Equipment to close the alternator contactor once rated frequency and voltage is reached at the input terminals and thereby place the set on load.
- d. Adjustable timer to allow the set to remain on load for a period of up to 10 minutes after the mains supply has been restored.
- e. Adjustable timer to allow the set to run on no load for a period of up to 10 minutes once the mains supply has been restored to the load.

Employer:		Contractor:	
Witness:		Witness:	



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- f. Equipment to automatically shut down the set and give a visual and audible indication of the nature of the fault in the case of "Low Oil Pressure", "High Engine Temperature" , "Overspeed" and "Underspeed".
- g. Visual and audible alarm indication of "Start Failure" in event of the engine failing to start after its set cranking attempts. The alarm must be operated via a adjustable timer to sound the alarm on for 60 seconds off for 30 seconds and then on and off until manually reset.
- h. Control selector switch to give the following modes of operation of the plant:
- OFF: D.C. control circuits will be isolated.
- AUTO: The plant will start and stop automatically depending on whether the mains supply is available or not.
- TEST: The automatic operation of the plant is tested without placing the plant on load.
- MANUAL: The set may be started and stopped by means of push buttons.
- i. Generator controller to provide the following digital
- alarms: Generator run (x2)
Generator fail
(xl)
- j. Controller to allow MODBUS protocol interfacing with telemetry system.

PG11.17 Manual engine start push button. PG11.18 Manual engine stop push button. PG11.19 Audible alarm cancel switch.
PG11.20 Audible alarm (to sound for 2 minutes off for 30 seconds and on again for 2 minutes). PG11.21 Sensing and control circuiting for control and switching of dummy load.

NOTE: The mains circuit must be rated for 500A and shall be capable of operating at a fault level of 35kA.

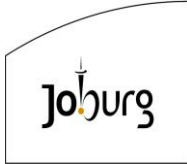
PG12 INSTALLATION

Except for the supply and connection of the incoming main and outgoing feeder cables, tenderers must include for the complete installation and wiring of the plant in running order.

The installation must comply with the requirements of SANS 10142 : Code of Practice for the wiring of premises as amended.

For the alternator circuit PVC insulated copper with armoured PVC sheathed cable must be used. For the control circuits either multi-core PVC cable or PVC insulated wires in conduit may be used. The neutral of the system must be solidly earthed.

Employer:		Contractor:	
Witness:		Witness:	



PG13 RADIATOR AIR DUCT, RADIATOR LOUVRE AND INLET LOUVRE

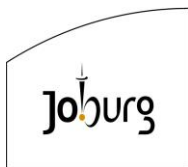
The radiator duct for the cooling of the engine are to be allowed for by the tenderer. The successful tenderer shall allow in his tender to supply a suitable radiator louvre and inlet louvre to the main contractor for building into the existing building. These louvres must be suitable to ensure sufficient ventilation over the generator set to prevent overheating when operating continuously at full load.

PG14 TEST PRIOR TO ACCEPTANCE

The equipment shall be subjected to a full load test at the manufacturer's works. Any defects which become evident at this time shall be corrected before acceptance.

All testing facilities, diesel fuel, etc. shall be provided by successful tenderer.

Employer:		Contractor:	
Witness:		Witness:	



PG15 COMMISSIONING

After completion of the electrical and mechanical installation, an on site performance test must be carried out. During this test the maintenance personnel must be fully instructed regarding the operation and maintenance of the plant.

PG16 DRAWINGS

OPERATING INSTRUCTIONS AND WIRING DIAGRAMS

Two sets of wiring diagrams, full operation instructions and parts books for the complete generator set shall be provided by the successful tenderer.

After the awarding of the contract the successful tenderer shall prepare a layout drawing of the generator room indicating the position of the equipment and cable trenches for approval by the Electrical Engineer before the main contractor shall start alterations to the existing building.

PG17 OCCUPATION HEALTH AND SAFETY ACT

All signs and notices as required by the Occupation Health and Safety Act shall be installed together with a first Aid kit and two fire extinguishers.

PG18 SPARES AND SPARES CABINET

A spares cabinet constructed of folded sheet steel painted to the same specifications as the control cubicle with lockable door shall be provided with the following spares:

- One set of engine filters
- One set of spare relays
- One set of spare timers
- One set of spare contactor coils (if contactors are used).

PG19 COMPLETION TIME

Completion of the emergency generator installation shall be done in accordance with the main contractor's programme.

PG20 PREFERENCE

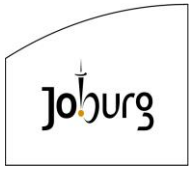
In case of discrepancies between the General Technical Specification and the Particular Specification of this document the Particular Specification shall receive preference.

PG21' CABLING

FROM	TO	CABLE SIZE	EARTH WIRE SIZE
Municipal supply	Change over panel for genset	2 x 185mm ² 4 core	ECC
Change over panel for genset	MCC	2 x 185 mm ² 4 core	ECC

The tenderer for the generator installation shall allow in his tender for:

Employer:		Contractor:	
Witness:		Witness:	



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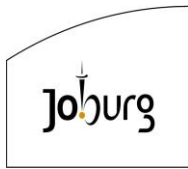
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- a. Termination of the above cabling into the generator set change over panel. The above cabling shall be supplied and installed by the Electrical Sub-Contractor.
- b. All other cabling required for power and control to complete the generator installation shall be included for in the tender price for the generator.

PG22 DUMMY LOAD

A dummy load suitably rated to protect the engine as per Manufacturer's prescriptions shall be provided.

Employer:		Contractor:	
Witness:		Witness:	



PG23 WEATHERPROOF - SOUNDPROOF CANOPY/CONTAINER

The genset shall be housed in a sound attenuated canopy/container.

The noise levels shall be attenuated to acceptable levels as per the local Municipality's Laws and Bylaws.

The canopy/container must be painted for exterior conditions as per the General Technical and Quality Specification.

Refer to the drawing for installation detail.

PG24 FUSIBLE LINK AND DIESEL SHUT-OFF SYSTEM

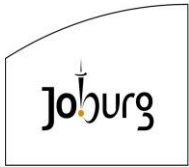
The generator set must be supplied with a fusible link and diesel shut-off system to stop the diesel supply to the engine in case of the generator set catching fire.

PG25 SCHEDULES OF INFORMATION (TO BE COMPLETED BY TENDERER)

PG25.1 ENGINE

DESCRIPTION		INFORMATION (TO BE COMPLETED BY TENDERER)
1.	Maker's name	-----
2.	Country of origin	-----
3.	Manufacturer's type no.	-----
4.	Continuous sea level rating after allowing for ancillary equipment in kW	-----
5.	Percentage derating for site conditions, in accordance with BSS 649 for altitude	-----
a.		-----
b.	for temperature	-----
c.	for humidity	-----
d.	total derating	-----
6.	Nett output on site in kW	-----
7.	Nominal speed in r.p.m.	-----
8.	Number of cylinders	-----
9.	Strokes per working cycle	-----
10.	Bore and stroke in mm	-----
11.	Swept volume in cub.cm.	-----

Employer:		Contractor:	
Witness:		Witness:	



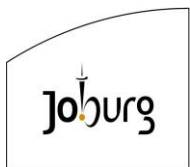
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12. Mean piston speed in m/min. -----
13. Compression ratio -----
14. Cyclic irregularity -----

Employer:		Contractor:	
Witness:		Witness:	



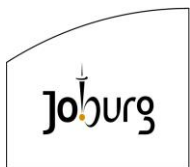
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DESCRIPTION	INFORMATION (TO BE COMPLETED BY TENDERER)
15. Fuel consumption of the complete generating set on site in litres per hour of alternator output at: a. Full load b. 3/4 load c. half load Note: A tolerance of 5 % shall be allowed.	
16. Make of fuel injection system	
17. Capacity of fuel tank in litres	
18. Is hand pump for filling the fuel tank included	NO
19. Method of starting	
20. Voltage starting system	
21. Method of cooling	
22. Type of radiator if watercooled	
23. Method of protection against high temperature	
24. Method of protection against low oil pressure	
25. Min. time required for acceptance of full load in seconds	
26. Are performance curves attached	

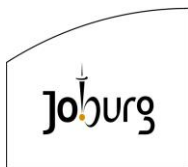
Employer:		Contractor:	
Witness:		Witness:	



PG25.2 ALTERNATOR

DESCRIPTION	INFORMATION (TO BE COMPLETED BY TENDERER)
1. Maker's name and distributor in RSA	
2. Country of origin	
3. Type of enclosure	
4. Nominal speed in r.p.m.	
5. Terminal voltage	
6. Sea level rating kVA	
7. Derating for site conditions	
8. Efficiency at 0,8 p.f.	
a. Full load	
b. 3/4 load	
c. half load	
9. Input required in kW	
10. Method of excitation	
11. Max. permanent voltage variation in %	
12. Transient voltage dip on full load application in %	
13. Voltage recovery on full load application in milli-seconds	
14. Is alternator brushless	
15. Class of insulation of windings	

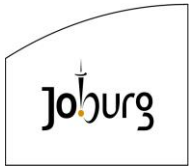
Employer:		Contractor:	
Witness:		Witness:	



PG25.3 CHANGE OVER/CONTROL PANEL

DESCRIPTION	INFORMATION (TO BE COMPLETED BY TENDERER)
1. Maker's name	
2. Country of origin	
3. Make of volt, amp and frequency meters	
4. Scale range of voltmeter	
5. Scale range of ammeters	
6. Ratio of current transformers	
7. Make of alternator circuit breaker	
8. Type of alternator circuit breaker	
9. Rating of alternator circuit breaker in A	
10. Make of mains isolator	
11. Type of mains isolator	
12. Rating of mains isolator	
13. Make of change-over equipment	
14. Type of change-over equipment	
15. Rating of change-over equipment	
16. Type of battery charging	
17. Are volt and ammeter provided for charging circuit?	

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
UPGRADE (FOREST HILL TOWER AND PUMP STATION),
JOHANNESBURG SOUTH

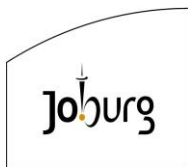


Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Generator

PG25.4 BATTERIES:

<u>DESCRIPTION</u>	INFORMATION (TO BE COMPLETED BY TENDERER)
1. Maker's name 2. Country of origin 3. Type of battery 4. Voltage of battery 5. Number of batteries 6. Capacity per battery in Ah	

Employer:		Contractor:	
Witness:		Witness:	



PG25.5 WEIGHTS AND DIMENSIONS:

DESCRIPTION	INFORMATION (TO BE COMPLETED BY TENDERER)
1. Mass of complete set	
2. Overall dimensions of set	

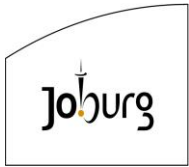
PG25.6 GUARANTEE

DESCRIPTION	INFORMATION (TO BE COMPLETED BY TENDERER)
1. Guarantee period in months	12 Months
2. State conditions of guarantee	Guarantee period will commence on issue of handover certificate by Engineer.

PG25.7 SPARE PART AND MAINTENANCE FACILITIES:

DESCRIPTION	INFORMATION (TO BE COMPLETED BY TENDERER)
1. Approximately value of spares carried in stock for these particular diesel engines	
2. Where are these spares held in stock	
3. Where are these facilities available	

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14402
TURFFONTEIN CORRIDORS OF FREEDOM – WATER
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JOHANNESBURG SOUTH

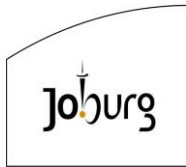


Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Generator

PG25.8 DRAWING:

Refer to drawing G01 : Generator Installation for generator room information.

Employer:		Contractor:	
Witness:		Witness:	



FOREST HILL WATER TOWER AND PUMP STATION

PART PP

PARTICULAR SPECIFICATIONS - PUMPS

The pumps shall be horizontal volute casing pumps, single-stage, with ratings and main dimensions to EN 733, long-coupled, in back pull-out design or similar. It shall be supplied with a bearing pedestal. The duty point of each pump shall be 835m³/hr at 35m head.

The suction nozzle should be mounted axially and the discharge nozzle should point radially upwards.

The shaft is required to be equipped with replaceable shaft sleeve/shaft protecting sleeve in the shaft seal area.

The volute casing and impeller has to be supplied with replaceable casing wear rings and shall be casted with integral pump feet. Impellers need to be trimmed to match the specified duty point, enabling energy savings.

Preference will be given to Pumps with a shaft rotational speed not exceeding 1500 r/min.

This type series complies with the requirements to be met by standardised water pumps as per EC Directive 547/2012 as of 1 January 2013. As stipulated by ErP Regulation 2009/125/EC.

The pumps shall have stable, non-overloading characteristics. Closed valve pressure shall be at least 20% higher than the duty pressure.

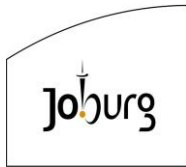
Unless specified to the contrary, the proposed pumps shall be able to operate without perceptible signs of cavitation in the full range of the operating envelope specified, pump sets running singly or in parallel. Throttling shall not be allowed. Should there be any doubts, the Contractor shall be called upon to carry out an inspection of the pumps and carry out NPSH tests to prove the equipment, at the Contractors expense. If the pumps are found to be faulty, the Contractor shall be given 8 weeks to remedy the problem. Thereafter if the Contractor is unable to resolve the problem it shall be cause for rejection.

All pump casings shall be hydrostatically tested at the Manufacturer's workshop and in the presence of the Employer's Agent or his Representative. The test pressure applied shall be equivalent to 1,5 times the pump shut off head, or alternatively twice the duty head specified, whichever is the greater.

The pump and motor shall be connected by a flexible coupling in such a manner that it shall not uncouple whichever way the impeller maybe rotating. The coupling shall accommodate small axial, lateral and angular misalignments without imposing undue stresses on the shaft and bearings.

The coupling shall be enclosed on a stationary solid-plate guard to the Engineers satisfaction.

Employer:		Contractor:	
Witness:		Witness:	



Anti-friction oil lubricated bearings will be fitted with a design life of at least 20 000 operating hours. The bearings in the pump casing together with its lubricating systems shall be suitable for the particular circumstances. The particular type and system offered by the Tenderer shall be fully specified.

The pumps should be supplied with mechanical seals. The seals shall not require a separate water supply and shall be suitable for the water to be pumped. Seal selection shall be done in collaboration with the seal manufacturer and proof that this has been done may be requested. If, in the opinion of the seal manufacturer, the quality of the water is such that a flush would be required to the seals, Tenderers are required to provide for a suitable system. Such a system shall be self-contained and inclusive of all necessary separators, filters, connections and auxiliary pipe work to provide the required flow to the seals at the appropriate pressure. The auxiliary pipe work and fittings should be in a suitable grade of stainless steel.

The material of construction of the pump should be as following:

- Volute Casing : Cast Iron
- Impeller : Bronze
- Shaft : Carbon Steel
- Shaft Sleeve : 316 Stainless Steel
- Wear Ring : Cast Iron

The following internal and external corrosion protection will be applicable to the pumps, motors, base-plates and guards: DWS 9900 C7.

Internal corrosion protection should consist of Belzona 1341 and have a DFT of 300µm.

Base-plates need be HDGMS.

One Original stress relief certificate for the base-plates need to be supplied.

The pump and motor base-plate shall be rigid. The upper face of each base-plate upon which the pump and motor are located, shall be machined flat and smooth to ensure that the pump is supported properly directly to the base-plate, without the use of spacers. Provision must be allowed to align the motor correctly to the pump through the use of suitable shims or spacers, the combined height of which should not exceed 3 mm. Drawings of baseplates shall be submitted for approval before manufacture.

Motors

Electrical motors shall be WEG or similar approved and shall be supplied as part of the mechanical equipment and shall be sized to comfortably meet the load requirements.

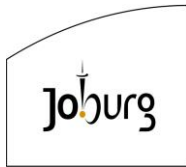
The maximum continuous rated output of the motor shall be not less than 10% above the maximum operating load, after site de-rating.

Motors shall be used in conjunction with Variable Speed Drives (VSDs) and shall be further de-rated as necessary to account for harmonic currents and low speed operation. The rating of motors shall be determined in accordance with the VSD manufacturer's recommendation.

The supplied motors need to comply with the following supply: 400 V; 3 phase; 50Hz; TEFC; IP55; IE3; 4 wire with earthed neutral that need to be supplied operated via VSD.

Motors shall have Class F insulation but the temperature rise shall not exceed Class B.

Employer:		Contractor:	
Witness:		Witness:	



Motors shall be of the squirrel cage induction type provided with either deep slots or double squirrel cages. The motors will be supplied with adequately designed grease lubricated anti-friction bearings.

All terminal boxes shall provide a minimum degree of protection of IP56, using only whole piece gaskets. They shall be of robust construction and be of ample size to allow free and easy access to the terminals for terminating the cables.

Facilities shall be provided for glanding cables. Each box shall be fitted with an internal earth stud for connection of the cable screens.

The Supplier/Manufacturer shall provide torque and load curves for the pump, motor and drive combinations, at offer stage, to proof successful starting and stopping of pump sets.

Motors shall be of a type-tested standard product design from a recognized electric motor manufacturer with an accredited Quality Management System to ISO 9001 or equivalent.

All motors, unless otherwise agreed, shall be capable of ten starts in one hour equally spaced in time with the coupled load and initially at specified ambient temperature. The motors shall have maximum continuous rated outputs for an S1 classification of duty in accordance with IEC 60034.

All alternating current equipment shall be capable of continuous operation at a voltage level between 90% and 110% of the nominal voltage, and short term operation at 80% of the nominal voltage during motor starting without deterioration. However, auxiliary systems shall be designed such that a motor terminal voltage on start-up shall not fall below 85% of nominal voltage. Under exceptional circumstances motor terminal voltage may reach 80% provided there is sufficient margin of torque to accelerate the respective drive.

Instrumentation

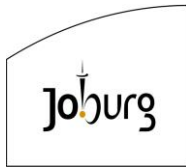
The pump and motor is required to be supplied with the following instrumentation:

- DE & NDE bearing vibration monitor – monitor should be Hansford HS-420 or similar
- DE & NDE bearing temperature probe – PT100
- Volute casing bearing temperature probe – PT100
- Motors to be supplied with anti-condensation heaters
- Motors to be supplied with thermistors, 1 per phase.
- The pump is required to be supplied with a local digital pump monitoring unit indicating the following:
 - Suction and discharge pressure including the differential pressure
 - The pump's current operating point
 - A load profile using all data compiled during the pump's operation.
 - Energy efficiency icon

Testing

It is a requirement that the pumps be witnessed performance tested at the manufacturer's work making use of the project specific motor at full speed. The pump performance test should be to ISO 9906 Class 1B.

Employer:		Contractor:	
Witness:		Witness:	



Seven individual performance points will be measured ranging equally from closed valve pressure to run-out point. One of the points will be the B.E.P and another point will be the required duty point. Should the pumps not meet or exceed the guaranteed efficiency at duty point the pumps will either be rejected or a penalty will be charged. The value of the penalty will be decided on the discretion of the Employer's Agent and/or client.

Vibration measurements shall be taken in the three axes at each bearing, i.e. axial and two radial components at right angles to each other.

General

All materials shall possess qualities adequate for the purpose for which they are to be used. All materials and properties claimed for these materials shall, unless specified otherwise in this document, comply with the requirements of the most recent edition of the appropriate South African or other internationally recognised standard specification. For each type of equipment, the Manufacturer shall indicate the materials used for each of the proposed sub-assemblies. The equipment shall be manufactured using new prime quality materials taking into account the latest technical innovations. All components shall have a surface finish in relation to their importance, their position and their intended purpose. Rolled steels and all castings shall be clean and free of blisters, porosity, shrinkage, holes, cracks or other flaws that may be detrimental to their use. The Tenderer shall indicate in his tender the proposed materials for each component of the assembly.

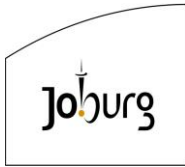
Castings

No repair of cast components will be permitted without the prior approval of the Employer's Agent. The filling of casting defects shall be carried out by approved highly qualified welders only, according to approved welding techniques. Any cast component requiring filling at any fabrication stage after the first anneal shall be subjected to further annealing treatment unless stipulated otherwise. Cast components shall not be warped or distorted in any way and shall not show any increase in dimensions (beyond that shown on the fabrication drawings) likely to cause interference with other components in the erection of the item of equipment for which they were made. The structure of cast components shall be homogeneous and free of non-metallic impurity. If, at critical points of a cast component, there is too great a concentration of impurities, the component shall be rejected.

Fasteners

Fasteners shall be stainless steel unless otherwise specified. All high tensile bolts and studs used shall bear the letters HTS stamped or engraved on the end. Washers shall be provided under all bolt heads and nuts. The threads of bolts and studs shall be cleaned and coated with a graphite/grease, copper based or other approved compound before assembly. The threads of all bolts and studs used with the equipment supplied shall be to the same standard. The length of bolts should be such that at least two threads protrude beyond the nuts, but not more than four threads. The threaded end of all bolts must point to the downstream direction of flow. The Tenderer shall indicate in his tender the materials proposed for each part of assembly.

Employer:		Contractor:	
Witness:		Witness:	



FOREST HILL – REHABILITATION OF EXISTING ELEVATED TOWER

PART PR

PROJECT SPECIFICATION

Rehabilitation of the existing tower is to be carried out by a specialist Sub-Contractor under the Main Contract and will become a nominated Sub-Contractor to the Main Contractor.

SCOPE

This project specification is set out in two portions. Portion 1 covers a general description of the project, the facilities available, and the requirements to be met. Portion 2 covers variations and additions to standardised and/or particular specifications applicable to this Contract.

STATUS

Should any requirements of the project specification conflict with any requirements of the standardised specifications listed in clause PS10, the requirements of the project specification shall prevail. This specification will form an addendum to the main contract. The Condition of Contract shall be the same as the main contract, GCC 2015 version.

PART 1

THE WORKS

PS1 GENERAL DESCRIPTION

This Contract comprises inter alia of the remedial work to the internal and external of the Water Tower as well as the sealing of joints and cracks internally and coating the internal, as well as the external of the Water Tower.

The work is broadly described, but not limited to:

PS2 DESCRIPTION OF SITE AND ACCESS

The site is situated in Turffontein in Johannesburg South along Rifle Range Road, about 1,3km east of the interchange with Klipriver Road. The site area is fenced and secure.

PS3 NATURE OF GROUND AND SUB-SOIL CONDITIONS

Not of importance to the project.

Employer:		Contractor:	
Witness:		Witness:	



PS4 **DETAILS OF CONTRACT**

The Bills of Quantities have been documented in a manner that indicates the scope of work to be done in the various areas.

- PS4.1 Preliminary and General
- PS4.2 Concrete Repairs
- PS4.3 Concrete Coating External
- PS4.4 Concrete Coating Internal

PS5 **CONSTRUCTION PROGRAMMING**

PS 5.1 Starting/completion dates

Anticipated start date: **18 months after commencement date**
Completion date: **24 months after commencement date**

PS 5.2 Programmes and reports required

The following requirements shall prevail:

5.2.1 Contractual programme

A contractual programme, meaning: a chart showing the different sections of construction making up the Works and the order, resourcing and sequence in which the work is to be carried out in order to achieve completion on the prescribed dates shall be submitted with the Contractor's tender. This programme shall, upon the Employer's Agent's agreement in writing, become a binding sub-contract programme.

Such program shall include for possible delays for inclement weather.

The Contractual program shall in addition clearly indicate any Contractor's float as may be applicable.

5.2.2 Construction programme

A construction programme, meaning: an agreed chart which shall be used to monitor the progress of the works shall be submitted within 14 days of agreement of the contractual programme by the Employer's Agent. This chart shall, as far as is practical, be based upon the agreed contractual programme, but shall not in any way relieve either party of their obligations or rights in terms of the contractual programme or the contract. The chart shall show the different sections of the Works suitably divided into elements and activities,

clearly indicating the start and completion dates of each activity and element against which the progress shall be monitored.

Employer:		Contractor:	
Witness:		Witness:	



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Section C4 Particular Project Specifications: Existing Tower

The Contractor is advised to determine the programming requirements of section 8.10 described below.

PS 5.3 Reports required

The Contractor shall provide the Employer's Agent a fortnightly report detailing the following:

- a) Date of report
- b) Working days elapsed from start
- c) Working days left to contractual completion and/or key dates and forecast of any slippage envisaged
- d) Percentage of work complete per activities on construction programme and forecast remaining time and resources required
- e) Supervisory staff and labour force on site
- g) List of constructional plant
- h) Delays encountered
- i) Information required
- j) Variation Orders and site instructions received
- k) Claims status (if any)
- l) Weather delays
- m) Signature of site agent

The Contractor shall in addition provide the Employer with weekly returns showing the number and grade of Employees employed and the number and type of Constructional Plant on site.

PS 6 **SITE FACILITIES AVAILABLE**

PS 6.1 Water for the Works

Potable water need to be supplied by the Client. The cost of further temporary reticulation shall be to the Contractor's account.

PS 6.2 Power supply

Power need to be supplied by the Client. The costs of any temporary reticulation; transformers, etc. shall also be to the Contractor's account.

PS 6.3 Air for the Works

Compressed air will not be supplied by the Client. The Contractor shall make all necessary provisions in this regard if necessary.

PS 6.4 Lay-down area

A specific area will be set aside for the use of the Contractor and has to be approved by the Client prior to commencement of works.

Employer:		Contractor:	
Witness:		Witness:	



PS 7 **SITE FACILITIES REQUIRED**

PS 7.1 Accommodation of labour force

No employees are to be accommodated on site.

PS 7.2 Temporary storage facilities

The Contractor shall make provision in his price for all temporary storage facilities if necessary. The location of these shall be agreed with the client prior to the commencement of works.

PS 7.3 Laboratory facilities

Approved testing laboratories may be nominated by the Contractor.

PS 7.4 Ablution and latrine facilities

The Contractor shall make provision for adequate and approved temporary ablution and latrine facilities for his workmen on site and their removal on completion of the Works. These facilities are to be kept in a clean and hygienic condition, to the approval of the Employer's Agent, at all times.

PS 7.5 Telephone facilities

Contractors will not have access to existing telephone facilities and must make their own arrangements in this regard.

PS 7.6 Equipment for Employer's Agent's staff

No equipment for the engineering staff needs to be provided.

PS 8 **FEATURES REQUIRING SPECIAL ATTENTION**

PS 8.1 Work on a Water Tower

The Works are being undertaken on the internal and external of a Water Tower. Security of the site and all equipment is the Contractor's responsibility.

PS 8.2 Existing Services

The location of existing services which may be affected by the works must be ascertained by the Contractor. Any damage caused by the Contractor to existing structures and services shall be repaired, to the satisfaction of the Employer's Agent.

PS 8.3 Dust

Employer:		Contractor:	
Witness:		Witness:	



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Section C4 Particular Project Specifications: Existing Tower

The Contractor shall take all necessary precautions to keep dust caused by the remedial activities to a bare minimum.

PS 8.4 Prevention of ingress of water into Works (Internal)

The Contractor must accept full responsibility, without the payment of specific compensation, for all risks arising from the ingress of water while working on the internal of the Water Tower. He shall take all possible measures and precautions, as he may deem necessary and expedient, to prevent water from entering the Works during the remedial contract.

PS 8.5 Liquid fuels and lubricants

The Contractor shall supply all required liquid fuels and lubricants.

PS 8.6 Key personnel

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

PS 8.7 Site meetings

The Employer's Agent shall hold regular site meetings and keep and circulate minutes. The Contractor shall attend these meetings and ensure that all sub-contractors are represented.

PS 8.8 Removal of rubbish and debris

Contractors shall, at all times, keep the site and surrounding areas free of all superfluous materials, rubbish, debris, etc. A temporary dumpsite area will be identified at the Site inspection. The Contractor is to allow for fencing off of this area with a shade cloth covered fence, and is to ensure the works remain contained within the fenced off area

PS 8.9 Access

Access to the property will be identified at the site inspection.

Prices to include for all access requirements.

PS 8.10 Programming

Contractors are advised that the programming of the works remains their responsibility.

It is the intention of this contract to provide the Contractor with uninterrupted access and working hours.

Employer:		Contractor:	
Witness:		Witness:	



Rates must allow for any interrupted access and the contractor's attention is drawn to clause PS8.1 in this regard.

PS 8.11 Control of work and Quality Assurance

It is an essential element of this contract that the control of the work, the Quality Control and Quality Assurance falls under the direct control of the Contractor. Should the Tenderer have a specialist sub-contractor special arrangements will be required in terms of their contractual arrangement to ensure that the above control is possible. Such arrangements are to the Tenderers discretion but the Tenderer must demonstrate that the arrangement is functional and workable to the entire satisfaction of the Employer's Agent.

The Quality Control on site shall be structured, and the Quality Control Manager of such a position as to have a veto on the progress of the works. Attention to detail will be of prime importance. Should the Quality be of an unacceptable standard, the Employer's Agent, who shall be the sole arbitrator as to the sufficiency of the standard achieved shall stop the Works and **NO other work shall continue until the Quality is of an acceptable standard.**

PS 9 **SECURITY AND SAFETY**

PS 9.1 Security

All security regulations set forth by Johannesburg Water are to be strictly adhered to and the Contractor is to make himself fully acquainted with all and any security conditions regarding personnel, material and equipment entering or leaving the property.

The Contractor shall, if so required by Johannesburg Water at any time during the currency of the Contract, remove from the works any employee engaged by him on the works and shall provide suitable replacements.

Should Johannesburg Water disclose the reason for requesting such removal, all costs involved in such removal and replacement shall be borne by the Contractor.

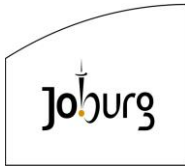
Should Johannesburg Water not disclose the reason for requesting such removal, all costs involved in such removal shall be for the account of Johannesburg Water.

Should an employee or employees employed by the Contractor be required to leave the Site, the Contractor's obligations in terms of the Contract shall in no way be altered.

PS 9.2 Safety

9.2.1 The Contractor shall provide, maintain and remove such hoarding, fans, screens, tarpaulins, drop sheets and other materials and items required to effectively uphold

Employer:		Contractor:	
Witness:		Witness:	



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JOHANNESBURG SOUTH

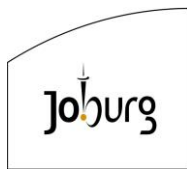


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and protect from damage the works, materials and property whether of Johannesburg Water or other owners and to secure the safety and freedom from injury of all persons.

- 9.2.2 The Contractor shall comply with Johannesburg Water safety/security regulations.

Employer:		Contractor:	
Witness:		Witness:	



PS 10 **APPLICABLE STANDARDISED SPECIFICATIONS**

PS 10.1 For the purpose of this Contract the Standardised Specifications and Codes of Practice for Civil Engineering Construction as approved by the Council of the South African Bureau of Standards as issued at date of tender shall apply.

SANS 1200A - GENERAL
SANS 1200C - SITE CLEARANCE

PS 10.2 For the purposes of this Contract, the following Particular Specifications are included:

ASR: Access for Structure Rehabilitation.
DSC: Demolition and Removal of Structural Concrete
CSP: Spall Repair of Concrete Members
RWS: Remedial Waterproofing Sealants
CWS: Cementious Waterproofing Coating

PS 11 **DRAWINGS**

The following drawings are issued with this document and are deemed to form part of this documentation.

Detailed drawings listed below:

Not Applicable.

Employer:		Contractor:	
Witness:		Witness:	



GENERAL: REMEDIAL WORK

VARIATIONS OF STANDARDISED SPECIFICATIONS

PSA1 MATERIAL

PSA1.1 Quality

All materials are to bear the mark of the South African Bureau of Standards where a standard is applicable to the particular material.

Materials shall be the best of their kind. Only new and undamaged materials shall be used in the Works. Materials to be permanently installed into the Works shall not be used for any temporary purposes on site.

Where reference is made in these Schedules of Quantities to proprietary types or trade names, the products or materials, etc., are, unless otherwise described, to be exactly those described.

Should the Tenderer wish to price for, or to supply, a similar article not of the specified type and/or method of manufacture, application must be made to the Employer's Agent not less than seven days prior to the closing date of tenders, to enable the Employer's Agent, to indicate his approval.

After the signing of the Contract the prior approval of the Employer's Agent must be obtained for any substitution and where materials, etc. are used other than those specified, adjustments in rates will be made and variation orders will be issued to substantiate these adjustments.

In all cases the word "approved" shall mean "approved by the Employer's Agent".

In all cases where the Contractor takes delivery of, handles, stores, applies and/or fixes any proprietary product, he shall do so in strict accordance with the manufacturers' authorised written recommendations and/or instructions.

In the event of a discrepancy between the Project Specification and the manufacturers' instructions, it shall be brought to the attention of the Employer's Agent.

PSA1.2 Structures and Natural Materials on Site

Old materials

Unless otherwise stated the whole of the materials arising from the alterations/remedial work, shall become the property of the Contractor and shall be carted away from site immediately it becomes available.

Employer:		Contractor:	
Witness:		Witness:	



The Employer reserves the right to retain any of the materials at the price shown in the list of credit for materials or if no price is shown in that list at no charge to the Employer.

Material set aside for re-use

Old materials specified as set aside for re-use, shall be carefully removed, cleaned, repaired as necessary, classified, stacked, stored and properly protected from damage until required for re-use.

Handing over of materials

Where certain materials, equipment, articles etc. are described to be handed over to the Employer, the Contractor shall obtain from the Employer an official receipt listing the materials handed over and the date of handover. Should the Contractor fail to submit such a receipt when requested to do so, it shall be deemed that the materials, equipment, articles etc., are still in his possession and he will be held liable for the full replacement value thereof, the value of which will be deducted from any moneys due to the Contract.

PSA2 PLANT

PSA2.1 Contractor's Offices, Stores and Services

The Accommodation of employees on the site will not be permitted and the Contractor shall make arrangements to accommodate his employees elsewhere.

PSA2.2 Scaffolding

The Contractor is required to price the cost of scaffolding under the relevant item in the Schedule of Quantities. The Contractor is to advise the Employer's Agent of the form of scaffolding he intends to use.

Tower scaffolding is preferred, however should the Contractor elect to use mobile scaffolding, no claim will be entertained for extensions of time due to days lost as a result of windy conditions.

PSA3 PROTECTION OF STRUCTURES

During the partial demolition of defective concrete etc. the utmost care must be observed to avoid any structural or other damage to the remaining portions of the work.

Such damage that is made to other elements shall be made good at the Contractor's expense.

Employer:		Contractor:	
Witness:		Witness:	



The method statement for the removal and replacement of the defective concrete shall be submitted to the Employer's Agent for approval. The repairs shall be carried out in small sections as not to compromise the structural integrity of the structure.

PSA4 TENDERER TO DEMONSTRATE ABILITY

The successful Tenderer must be able to demonstrate, to the Employer's Agent's satisfaction, that he is equipped to carry out the remedial works tendered for. The Employer's Agent shall be the sole judge as to the Tenderer's ability or otherwise. The successful Tenderer shall also be required to demonstrate that they have at least five (5) years' experience in the relevant field of remedial works.

PSA5 SITE VISIT

It is an essential condition of this contract that the Contractor visits the site to determine the exact working conditions, access, nature of the demolitions, remedial works and the intended scope of work. The submission of a Tender shall be deemed to be evidence of his visiting site notwithstanding anything to the contrary. No claim will be accepted for work not envisaged at tender stage which was ordinarily visible at such a site visit or was pointed out to the Contractor at the Site inspection.

PSA6 EXTENSION OF TIME DUE TO RAIN

The Contractor is advised that only the official records of the nearest meteorological station will be considered for the application of extension of time due to rain. Should there not be a meteorological station within the vicinity and the Contractor considers that he will be prejudiced as a result, he is to install at contract commencement a rain gauge, which is to be monitored and recorded daily.

PSA7 TESTING

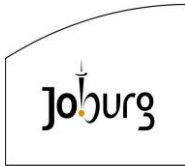
PSA7.1 Principles

These clauses are amended to provide that the Contractor shall implement a quality control and assurance programme in accordance with the "Quality Assurance program" forming part of these tender documents.

The Contractor shall provide all necessary personnel and facilities to implement the programme including the provision of a qualified and competent quality control technician whose time will be solely devoted to quality control and assurance matters for the full duration of the contract.

Tenderers are to allow for all costs associated with implementing the QA/QC programme under the heading of "Quality Assurance" in the Preliminary and General section of the schedules of quantities.

Employer:		Contractor:	
Witness:		Witness:	

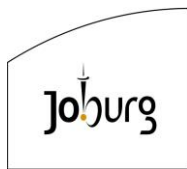


PSA8 PROTECTION OF SERVICES

The Contractor shall protect all drainage pipes, manholes, water supply, electrical cabling as shown on the drawings or as may be indicated on site.

PSA9 The Contractor shall adhere at all times to Johannesburg Water Safety Rules and Regulations.

Employer:		Contractor:	
Witness:		Witness:	



SPECIFICATION ASR: ACCESS FOR STRUCTURE REHABILITATION

CONTENTS

CLAUSE DESCRIPTION

ASR1	SCOPE
ASR2	INTERPRETATIONS
ASR3	GENERAL REQUIREMENTS
ASR4	MATERIALS
ASR5	PLANT AND EQUIPMENT
ASR6	CONSTRUCTION
ASR7	MEASUREMENT AND PAYMENT

Employer:		Contractor:	
Witness:		Witness:	



ASR1 **SCOPE**

This specification covers the requirements for the provision of suitable and safe on-site access to all areas requiring repair work or treatment in accordance with the contract, and for inspections by the Employer's Agent.

ASR2 **INTERPRETATIONS**

(a) **Supporting Specification**

Where this specification is required for a project the following specifications shall, inter alia, form part of the contract document:

- (i) Project specification
CWS
RWS
DSC
CSP

- (b) Definitions

Temporary works

The temporary works for access to the work area includes all foundations, scaffolding and support structures, working platforms, fixtures to existing structural members, etc. required for the safe access and execution of the work, and the protection of passing persons and vehicles against injury or damage.

Additional special measures associated with specific work activities are excluded and must be provided for under the relevant sections.

ASR3 **GENERAL REQUIREMENTS**

The contractor shall provide and shall be responsible for safe access to structures and work platforms to all areas requiring remedial work. The access and temporary works shall be designed, constructed, and maintained in accordance with the current relevant safety regulations, all to the satisfaction of the Employer's Agent. Appropriate allowances shall be made for screening and other protective measures required by the various work activities.

Notwithstanding approval given by the Employer's Agent for the design and drawings prepared by the contractor and the acceptance of the temporary works including the working platform(s) and access structure as constructed, the

contractor shall be solely responsible for the safety and adequacy of the temporary works and shall indemnify and keep indemnified the employer and

Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Existing Tower

Employer's Agent against any losses, claims or damage to persons or property whatsoever which may arise out of, or in consequence of the design, construction, use and maintenance of the temporary works and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

The contractor shall submit to the Employer's Agent the relevant design details and drawings of the working platform(s) and access structures for comment and/or record purposes.

The Contractor shall provide access facilities for inspection and testing by the Employer's Agent during construction.

ASR4 **MATERIAL**

All timber, structural steel and scaffolding used shall be free from defects that may prejudice the stability of the working platform(s) and access structures. The jacks, devices, clamps and fittings shall all be in good working order and of adequate design and strength.

The type, grade and condition of the material shall be subject to the Employer's Agents' approval.

ASR5 **PLANT AND EQUIPMENT**

Scaffolds and Platforms

Temporary works entailing scaffolds and platforms providing access to the work area shall be assembled and constructed from materials and structural sections complying with the relevant specifications. The temporary works shall be designed, erected, operated, maintained and dismantled so as to ensure that safe working conditions prevail for all site personnel, and where necessary the general public traversing the site.

ASR6 **CONSTRUCTION**

All access structures and work platforms and associated works shall be erected, modified or dismantled under the direction of an experienced and competent supervisor.

Prior to using any access structure or facility, and at regular intervals thereafter as approved by the Employer's Agent, or following unforeseen circumstances, the temporary works shall be inspected and certified by a suitably experienced and qualified person on behalf of the Contractor.

Employer:		Contractor:	
Witness:		Witness:	



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To ensure the safety of, and to prevent damage to passing persons, vehicles etc. the temporary works shall be enclosed with a suitable screening membrane or boarding where necessary to contain material or work equipment within the limits of the restricted work area.

Suitable debris containers and chutes shall be provided to assist in the removal of debris and unusable or rejected materials. Care shall be taken to avoid debris falling on pedestrians or vehicles.

Where temporary works are to be fixed to, or supported from an existing permanent structure, the location and method of attachment shall be subject to the approval by the Employer's Agent. Such temporary works shall be removed when the work is completed and any holes, surface damage or blemishes arising from the fixture shall be repaired to the surface finish of the adjacent surface to the satisfaction of the Employer's Agent.

ASR7 **MEASUREMENT AND PAYMENT**

The payment items in this clause shall include full compensation for all works associated with providing suitable and safe access on site to all areas covered by the contract which are not already covered by the measurement and payment items of the Standard Specification all temporary works related to access structures and work platforms, or mobile access units including associated plant, equipment and labour.

Item	Unit
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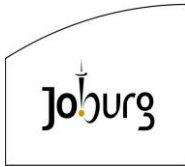
7.1 Temporary access structures to provide working platforms for all work specified.	
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Fixed Scaffold	Sum
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The unit of measurement shall be the relevant area for which the access structure is provided

For fixed scaffold 40% of the lump sum will be paid when the access structure is erected and a further 40% will become payable, pro rata, to the progress of the work for which the access is required. The final 20% will become payable after removal of the access structures.

Employer:		Contractor:	
Witness:		Witness:	



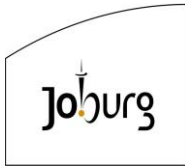
SPECIFICATION DSC: DEMOLITION AND REMOVAL OF STRUCTURAL CONCRETE

CONTENTS

CLAUSE DESCRIPTION

DSC1	SCOPE
DSC2	INTERPRETATIONS
DSC3	MATERIALS
DSC4	PLANT AND EQUIPMENT
DSC5	CONSTRUCTION
DSC6	TOLERANCES
DSC7	QUALITY ASSURANCE AND TESTING

Employer:		Contractor:	
Witness:		Witness:	



DEMOLITION AND REMOVAL OF STRUCTURAL CONCRETE

DSC1 SCOPE

This specification covers the requirements for the partial removal of concrete from a concrete member. The surface preparation of the concrete face which is to receive repair material is covered in Specification CSP.

DSC2 INTERPRETATIONS

(a) Supporting Specification

Where this specification is required for a project the following specifications shall, inter alia, form part of the contract document:

- (i) Project Specification
 - Specification CSP
 - Specification RWS
 - Specification CWS

(b) Definitions

Concrete members

All references to concrete shall include mass concrete, unreinforced and reinforced concrete members.

Removal

Cutting back into the member material from an existing concrete surface or member end to partially remove such material and to expose a sound surface for bonding new material to extend a member to new dimensions or form.

DSC3 PLANT AND EQUIPMENT

(a) General

All plant and equipment used for the demolition of concrete members or the removal of portions of a concrete member or material shall be based on proven and accepted technology within the industry. The plant and equipment shall be inspected and maintained on a regular basis to ensure that the plant and equipment remains in good working order, functions efficiently and that safety is not compromised.

Employer:		Contractor:	
Witness:		Witness:	



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Section C4 Particular Project Specifications: Existing Tower

The plant and equipment used for the demolition or removal process shall be of the accepted type and capacity for the relevant application. The suitability of the chosen method shall be demonstrated on a representative test section identified by the Employer's Agent prior to the execution of any programmed work.

(b) Access structures and working platforms

Where necessary, the contractor shall provide suitable and safe access structures, working platforms, debris collection and removal chutes and bins, including protection screens where required, at each location of concrete demolition or removal operations. Such provision shall be included in accordance with Specification ASR

The temporary structures, platforms, chutes, etc. must be stable and of sufficient strength and rigidity to safely carry the imposed temporary loads arising from the work activity.

DSC4 CONSTRUCTION

(a) Sequence of execution

The method and sequence of demolition or concrete removal shall be in accordance with the approved method statement submitted by the Contractor following pre-construction testing if necessary, and any written instruction issued by the Employer's Agent.

(b) Site preparation and access

The necessary access and temporary support structures shall be in place prior to the commencement of or concrete removal work. If deemed necessary to ensure acceptable environmental, health and safety conditions, screening and protective measures shall be established around the work area.

(c) Partial removal of concrete from structural elements

(i) Cutting back concrete to a new finished surface.

The concrete and reinforcement must be cut back to provide the prescribed concrete cover to the new finished surface as indicated on the drawings or as directed by the Employer's Agent. The technique used shall be suited to its intended use and shall not cause damage to the remaining concrete member.

Only techniques that do not damage the inherent structure, bond or strength of the remaining sound concrete shall be used. The thermal cutting technique shall not be used closer than 100mm from the final surface as indicated on the drawings. The remaining concrete shall be removed using approved mechanical equipment.

Employer:		Contractor:	
Witness:		Witness:	



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The exposed contact surface shall be bounded by straight line edges cut at least 10 mm deep by a diamond cutting saw, angle grinder or other approved equipment.

(ii) Cutting out cracks

Where cracks as indicated by the Employer's Agent are to be cut out, it will be cut in straight lines using a diamond cutting saw. All angles will be rectangular. The cut shall be at least 10 mm deep. The concrete will be removed until the crack disappears in a direction perpendicular to the concrete surface. If the crack protrudes beyond 20 mm behind the reinforcing, it will be brought to the attention of the Employer's Agent. The width of the concrete to be removed shall be 30 mm either side of the centre of the reinforcing.

(iii) Partial depth removal of surface concrete and exposure of reinforcement

Where unsound or contaminated surface concrete has to be removed, and corroded reinforcement must be exposed special care shall be applied while breaking the concrete from reinforcement steel or embedded anchorage to prevent loss of bond in the remaining sound concrete. Chipping tools shall be selected such that the surrounding concrete is not damaged. Unnecessarily heavy equipment and/or sharp-edged tools may lead to damage of the surrounding concrete thereby creating additional areas of potential failure.

Where active corrosion of reinforcement bars is exposed, the concrete shall be removed along and, if necessary, 20 mm around the bar length until a 50 mm continuous length of bar free from corrosion is exposed.

Where sections of reinforcement bars must be replaced, additional concrete may have to be removed to accommodate lap lengths, coupler units, etc and any additional clearance requirements for access with associated equipment. Such removal shall be subject to the Employer's Agent's approval.

Large surface areas requiring the removal of a relatively thin layer of concrete free from reinforcement may be effectively treated with a scrabbler, scarifier or planer.

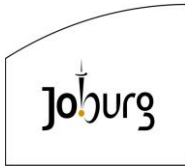
The exposed contact surface shall be bound by straight line edges cut at least 10 mm deep by using a diamond cutting saw, angle grinder or other approved equipment.

(d) Surface preparation for contact surfaces

All loose and shattered concrete, as well as foreign material such as oil, grease, dust etc. must be removed from the contact surface of old to new concrete. The aggregate must be exposed to provide a good bonding surface.

The mechanically prepared concrete surface shall be cleaned by means of oil-free compressed air or water jetting.

Employer:		Contractor:	
Witness:		Witness:	



The final preparation of concrete contact surfaces shall conform to the requirements of the relevant repair section of Specification CSP.

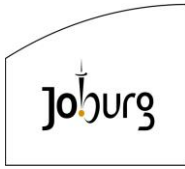
DSC6 TOLERANCES

The Contractor shall remove concrete to a planar, uniform surface with 25 mm maximum deviation from the level or dimension indicated on the drawings or by the Employer's Agent unless otherwise approved by the Employer's Agent. The outer edge of the contact surface shall comprise straight lines with maximum deviation of 5 mm over a 1 m long straight edge, and shall be within 5 mm of the theoretical position indicated on the drawings, or as instructed by the Employer's Agent.

DSC7 TESTS

The contractor shall carry out pre-construction tests with the proposed equipment to determine the suitability of the technique for the envisaged application. The test results shall be reported to the Employer's Agent and are subject to the Employer's Agent's approval.

Employer:		Contractor:	
Witness:		Witness:	



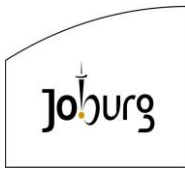
SPECIFICATION CSP: SPALL REPAIR OF CONCRETE MEMBERS

CONTENTS

CLAUSE DESCRIPTION

CSP1	SCOPE
CSP2	SUPPORTING SPECIFICATIONS
CSP3	CLEANING OF OVERALL CONCRETE SURFACES
CSP4	SURVEY AND TESTING OF CONCRETE STRUCTURES
CSP5	REMOVAL AND CUTTING OUT CONTAMINATED AND DEFECTIVE CONCRETE
CSP6	CLEANING OF REINFORCEMENT AND/OR EMBEDDED METAL
CSP7	REPAIR MATERIAL AND COATINGS
CSP8	FORMWORK
CSP9	PROTECTION AND CURING OF REPAIR MATERIAL
CSP10	REINFORCING STEEL SURFACE PREPARATION
CSP11	HAND PLACED CEMENTITIOUS REPAIR MORTAR
CSP12	CEMENTITIOUS GROUT
CSP13	CEMENTITIOUS COATING
CSP14	MEASUREMENT AND PAYMENT

Employer:		Contractor:	
Witness:		Witness:	



SPALL REPAIR OF CONCRETE MEMBERS

CSP1 SCOPE

This specification covers the requirements for the repair of spalling concrete.

CSP2 SUPPORTING SPECIFICATIONS

The following specifications shall, inter alia, form part of this specification

- a) The project specification,
- b) SANS 1200 A : General,
- c) SANS 1200 G : Concrete (structural),
- d) Variation to SANS 1200G:

The reinforced concrete repairs shall be carried out in compliance with the requirements of:

- a) the local bye-laws;
- b) this Specification;
- c) relevant SANS specification; and to
- d) the satisfaction of the Employer's Agent or his representative

CSP3 CLEANING OF OVERALL CONCRETE SURFACES

3.1 General

All exposed external concrete shall be cleaned and prepared to achieve a contaminant free open textured concrete surface to the approval of the Employer's Agent. This must fully expose all defects including cracks, honeycombing, blowholes, day work joints, etc. and remove all contaminants including moss, lichen, algae, oil, grease, efflorescence, skims, renders, old repair material, coatings, etc.

3.2 Contractor to provide method statement

The Contractor shall include in his method statement his intended method of cleaning and preparation. However, such method statements will not limit in any way the Contractor's contractual obligations to meet the requirements of the proceeding and following sub-clauses and this Specification generally, to the entire satisfaction of the Employer's Agent or his representatives.

The Contractor shall satisfy the Employer's Agent prior to commencing with the works that his stated method of surface preparation is practical, economical and acceptable to the Client.

Employer:		Contractor:	
Witness:		Witness:	



3.3 Cleaning of adjoining elements

All adjoining elements, equipment, fittings etc. shall be thoroughly cleaned of all cleaning materials and residue which remains resting upon or lodged in same on completion of the aforementioned concrete operations.

3.4 Acceptable methods of cleaning

The method of cleaning is the Contractor's responsibility and depends on the existing surface.

If the surface is uncontaminated then the surface may be cleaned by means of a high-pressure wash at a minimum pressure of 350 bars at 16 litres/minute.

Where the surface is contaminated or has to have all laitence removed then the surface should be abrasive blast cleaned. The existing coating will have to be removed by mechanical means.

All areas which are to be grit blasted are to be agreed in writing by the Employer's Agent prior to grit blasting. Such approval would normally be indicated by an initial on the QC sheet supplied by the contractor, which exactly identifies the location of and dimensions of the area involved.

3.5 Abrasive Blast cleaning of Concrete

3.5.1 Choice of abrasive and degree of blast cleaning required

Blast cleaning of concrete is carried out generally to remove surface laitence or existing coatings from the concrete and to provide the ability of subsequent applications to penetrate. In certain circumstances, it is necessary to expose the main aggregate (stone) of the concrete to improve the structural bonding.

This is normally necessary when improvement in the shear strength of the bond is required. For surface coatings a light blast cleaning (brush off) is all that is required to achieve the correct bond. A medium sandpaper finish is to be achieved.

The degree of blast cleaning is achieved by using different size aggregates, (where coarse aggregates for deep etching and fine aggregates for brush off blasting) and by the duration of the blast cleaning.

Employer:		Contractor:	
Witness:		Witness:	



CSP4 SURVEY AND TESTING OF THE CONCRETE STRUCTURES

4.1 Visual inspection and hammer test

These tests are to be undertaken by the contractor as a matter of course.

External concrete surfaces shall be visually inspected and hammer tested to locate and expose defective areas that are not readily visible. All defects including records of contamination or other matter related to the adequate repair of the element shall be noted on record sheets and/or plan/elevation drawings.

CSP5 REMOVAL AND CUTTING OUT CONTAMINATED AND DEFECTIVE CONCRETE

The removal of concrete shall be done in accordance with this Specification.

5.1 Area to be clean

Prior to the commencement of placing repair materials or coatings in any section of the structure, all framework and reinforcement shall be fully fixed and clean over the entire area of the proposed repair. Parent concrete shall be clean and free of dust and other deleterious matter.

5.2 Mechanical demolitions

Where indicated in the Specifications or by the Employer's Agent as determined on site, defective, contaminated concrete or old repairs shall be broken out by mechanical means to sound alkaline concrete and tested with phenolphthalein solution where necessary to ensure that all non-alkaline concrete has been removed.

The use of heavy power tools which could lead to fracturing of surrounding concrete or reinforcement damage is not permitted. All breaking out shall be carried out using sharp tools in order to avoid unnecessary damage to the remaining concrete.

5.3 Surface cracks

All cracks in the surface of the concrete are to be identified and cut out (chased) as directed by the Employer's Agent to a neat line.

- i) Expose corroding reinforcement, and/or
- ii) Ensure that reinforcement is not corroding, and/or
- iii) Remove loose concrete debris and other deleterious materials.

The extent to which concrete is cut for the purpose of repair must be approved by the Employer's Agent prior to commencing with repair of these broken-out areas. The

Employer:		Contractor:	
Witness:		Witness:	



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contractor shall ensure that adequate supervision of all breaking out operations is provided such that over-break is limited to +10mm.

5.4 **Feathered edges**

Feathered edges to cut out areas are not permissible and a minimum rebate at right angles to the surface of 10mm is required to be formed to receive the repair mortar.

5.5 **Contractor to maintain structure stability**

The contractor shall not commence breaking out any concrete, which might endanger the stability of the structure or element and is to bring such areas to the attention of the Employer's Agent for his written decision.

The Contractor shall exercise care in breaking out the defective concrete so that adjacent sound structural or aesthetic elements are not damaged in the process.

CSP6 CLEANING OF REINFORCEMENT AND/OR EMBEDDED METAL

6.1 **Removal of reinforcing to satisfaction of Employer's Agent**

Corroded reinforcing is to be removed only on the written instruction of the Employer's Agent or his representatives.

6.2 **Bending of reinforcement**

No reinforcement shall be bent or cut without the consent of the Employer's Agent. All corroded reinforcement, ferrules, etc. shall be fully exposed along their corroding length and for a distance of approximately **50mm beyond such corrosion**. (It is not necessary to cut behind non-corroding bars, ferrules, etc. embedded in sound uncontaminated alkaline concrete).

6.3 **Breakout of concrete behind reinforcement**

Where it is necessary to break out concrete from behind reinforcement, ferrules, etc. the breakout shall be at least 20 mm behind the embedded metal unless alternatively instructed by the Employer's Agent.

6.4 **Cleaning of reinforcement**

All corroding reinforcement, ferrules, etc. shall be thoroughly cleaned to remove all corrosion and expose clean metal. A high standard of preparation is required similar to that used in the preparation of steel for painting. (Swedish Standard SA2½) or ST3.

On areas where it has become necessary to break out concrete behind reinforcing bars, ferrules, etc. the back of such bars, ferrules, etc. shall be cleaned to the same standard.

Employer:		Contractor:	
Witness:		Witness:	



In locations where the corrosion is severe and more than 10% of the reinforcement area has been lost, the Employer's Agent is to be immediately informed before proceeding further with the repair.

6.5 **Drying of reinforcement**

After surface preparation of the reinforcing steel but before applying the priming coat, the reinforcement, ferrules, etc. shall be dried by compressed air which shall also remove dust and other loose material.

CSP7 REPAIR MATERIAL AND COATINGS

7.1 **Material to be that specified**

All repair materials and coatings used in the works shall be those as specified and precisely as detailed in this Specification and in the manufacturer's technical data sheets which form an integral part of this Specification.

7.2 **Water requirement**

Water used shall be clean potable water.

CSP8 FORMWORK

8.1 **Contractor responsible for design and position of formwork**

The Contractor shall be responsible for the design and fixing in position of all temporary formwork that may be necessary and such formwork shall be so

constructed that it remains true to line and level under the loads imposed by the repair materials during all stages of construction. The Contractor shall ensure that there is no leakage of grout or fine material from wet repair materials.

8.2 **Formwork to be coated**

The Contractor shall ensure that all formwork is coated and/or adequately treated such that it does not absorb water from the repair mortar.

8.3 **Repair of material damaged by formwork removal etc.**

The Contractor shall remove and reconstruct or otherwise rectify to the satisfaction of the Employer's Agent, any repair material damaged by premature or incorrect removal of formwork and/or propping thereto.

In locations where formwork is fixed or maintained in position by piercing, fixing on to or through existing building fabric this shall be repaired by the contractor at his own

Employer:		Contractor:	
Witness:		Witness:	



expense in accordance with this specification and to the satisfaction of the Employer's Agent.

Formwork supports which are permanently embedded in the repair material shall not be permitted, unless approved in writing by the Employer's Agent.

CSP9 PROTECTION AND CURING OF REPAIR MATERIAL

9.1 General

During periods of hot weather and under conditions of drying winds, repair mortar and coatings shall be placed as quickly as practicable and the Contractor shall take particular care to minimize the effects of such conditions so as to prevent drying to minimize shrinkage.

9.2 Contractor to specify means of protection

The contractor is to specify the means of protection he intends to use prior to commencement of the works and receive written approval thereof from the Employer's Agent.

9.3 Exposed faces to be protected from temperature changes

All exposed faces of placed repair mortar and coatings shall be protected against rapid temperature changes and from drying out for a period of 4 days after the repair mortar or coating has taken its initial set.

9.4 Method of Curing

The method of curing shall prevent loss of moisture from the repair mortar or coating. The fixing by appropriate means of polythene is one approved method.

Spray curing techniques employing curing compounds are not permitted. All necessary precautions shall be taken to ensure that protective sheeting, etc. that may be used to comply with this clause does not impair the final surface of the repair or protective coating so as to affect the finished performance or appearance.

CSP10 REINFORCING STEEL SURFACE PREPARATION

10.1 SA2½ or ST3 is the minimum acceptable standard for preparation of the steel prior to painting.

10.2 Reinforcement Protective Coating

Immediately after cleaning (within 2 hours) and following air cleaning as described above, the reinforcing bars shall be given 2 coats of the reinforcement protective coating

Employer:		Contractor:	
Witness:		Witness:	



-the second coat being applied just after the first coat has set. Where part of the reinforcing bar, ferrules, etc. remain embedded in sound alkaline concrete, the reinforcement protective coating is to overlap on to the concrete by approximately 10mm. The Contractor shall exercise due care in ensuring that all exposed reinforcement, is fully coated with the reinforcement protective coating over their whole exposed perimeter, particularly in those positions where concrete has been removed from behind the reinforcement.

10.3 **Bonding Primer Coat**

The bond coat shall be applied to the pre-dampened surface (saturated, surface dry) of the concrete repair area. The bond coat shall be applied immediately prior to application of the repair mortar whether applied as the priming bond coat or between successive layers of repair mortar.

The bond coat shall not be allowed to dry unless specified so in the manufacturers' instructions, prior to application of the repair mortar. Any bonding agent not complying with these instructions shall be fully re-coated at the Contractor's own cost prior to continued application of the repair mortar.

CSP11 HAND PLACED CEMENTITIOUS REPAIR MORTAR

11.1 **General**

Apply immediately to the bond coat in the repair areas (wet on wet) a cementitious repair mortar in layers not exceeding 40 mm in depth (minimum depth 10mm) unless the manufacturers' data sheet states otherwise. Allow for initial set between successive layers (3-8 hours dependent upon climatic conditions) and pre-dampen if required. On all repair mortars if time between layer applications is in excess of 12 hours then another layer of the bonding coat is to be applied. The Contractor's costs for carrying out such operations shall be included in his unit rate for repairs.

11.2 **Compaction in layers**

The repair mortar shall be thoroughly compacted in layers into the repair area or into shuttering in positions where an arris, rebate, raised rib or similar is required and brought up to reform the original profile. In placing the repair mortar care shall be taken to ensure full compaction and absence of voids.

CSP12 CEMENTITIOUS GROUT

12.1 **Large areas of repair**

Where large areas of broken out concrete are to be repaired, application by means of concrete grout techniques may be used in preference to repair patching by hand. A

Employer:		Contractor:	
Witness:		Witness:	



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shrinkage compensating free flowing high strength cement based concrete with a maximum aggregate size of 13mm is to be used for large repair volumes.

12.2 **Bond coat**

All large areas to be grouted shall receive a modified bonding coat as previously specified when the finishing to the shuttering and whole grouting operation can be completed within a single shift of 8 hours. Where this is not feasible the concrete surface shall be thoroughly dampened (saturated, surface dry) prior to the placement of the grout.

12.3 **Placement of repair grout**

The grout shall completely fill the void and the contractor shall ensure that air entrapment cannot take place. An adequate head is to be provided to the grout pour to ensure that these conditions are met. The grout shall be agitated to ensure compaction. No mechanical vibrators are to be used. Should the grout not completely fill the void the Employer's Agent may instruct that the repair be broken out and be regrouted.

CSP13 SKIM COAT

Seal all blow holes and defects in the concrete substrate with approved skimming mortars.

CSP14 INTERNAL AND EXTERNAL COATING

The concrete surfaces as directed by the Employer's Agent shall be coated with an elastic polymer modified cementitious coating Sika Lastic-150 or similar, to a thickness of 3mm. Colour Light Grey.

CSP15 MEASUREMENT AND PAYMENT

The pay items in this clause shall include full compensation for all work associated with the repair of concrete structures which are not already covered by the measurement and pay items of the Standard Specification or the Project Specification e.g. all procurement, transport, additional access and temporary works, plant and equipment required to undertake the work specified.

The quantities indicated in the Schedule of Quantities are based on inspections performed as part of the preliminary and detail design phases. The actual work may result in significant variations as the work is executed which shall be considered in terms of the Special Conditions of Contract.

Item

Unit

Employer:		Contractor:	
Witness:		Witness:	



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- 15.1 Cutting back concrete to a new surface to remove contaminated or spalled concrete as per CSP5. cubic metre (m³)

The unit of measurement is the cubic metre of concrete cut back, measured in its original position on a structural member.

The tendered rate shall include full compensation for all labour, materials, equipment, screening and protective measures, plant etc. that is required to cut back the concrete and reinforcement to the profile shown and to load, transport and dump the material at the nearest approved dumping area.

Item	Unit
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- 15.2 Cutting back concrete to expose reinforcement to 20 mm beyond reinforcing as per CSP5 and CSP6. cubic metre (m³)

The unit of measurement is the cubic metre of concrete cut back, measured in its original position on a structural member.

The tendered rate shall include full compensation for all labour, materials, equipment, screening and protective measures, plant etc. that is required to cut back the concrete and reinforcement to the profile shown and to load, transport and dump the material at the nearest approved dumping area.

Item	Unit
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- 15.3 Concrete contact surface preparation to achieve a contaminate free open textured concrete surface by means of high-pressure wash at a minimum pressure of 350 bars. Square metre (m²)

The unit of measurement is the square metre contact surface that is prepared for repair.

The tendered rate shall include full compensation of all labour, materials, equipment, plant, etc. that is required to adequately prepare the concrete surface for remedial work.

It shall also include for the cleaning and treating of embedded and exposed reinforcement to accept a primer coat.

Item	Unit
------	------

- 15.4 Extra over for 13.3 including shot for shot blasting as per CSP3.5. Square metre (m²)

Item	Unit
------	------

- 15.5 Cleaning reinforcement to SA2½ or ST3 standard Square metre (m²)

Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Existing Tower

and corrosion protection coating to
reinforcement as listed in approved list
of products.

The unit of measurement is the square metre surface area cleaned to SA2½ or ST3
and coated determined from the nominal bar size perimeter and length of bar.

The tendered rate shall include full compensation for all labour, materials, plant,
equipment, safety precautions, wastage etc. required for the supply, preparation and
application of the coating to the required thickness.

Item	Unit
15.6 Bonding layer as per Specification CSP11.3	Square metre (m ²)

The unit of measurement is the square metre surface area bonding layer applied.

The tendered rate shall include full compensation for all labour, materials, equipment,
etc. that is required for the supply, preparation and application of the bonding layer to
the prepared concrete contact surface.

Item	Unit
15.7 Proprietary cementitious repair compound	
Hand placed mortar as per Specification CSP11.	cubic metre (m ³)

The unit of measurement is the cubic metre of proprietary repair compound used in
the structural repair measured in situ.

The tendered rate shall include full compensation for all labour, materials, plant and
equipment required for the supply and delivery, storage, mixing and placement of the
proprietary repair compound, and finishing the surfaces after removing all projections
resulting from access openings for the placement of the repair compound.

No payment shall be made for material not prepared and placed according to the
Manufacturer's specification nor for any excess mixed material or wastage.

New reinforcement shall be measured separately.

Item	Unit
15.8 Proprietary cementitious grout as per. Specification CSP12	cubic metre (m ³)

The unit of measurement is the cubic metre of proprietary repair compound used in
the structural repair measured in situ.

Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Existing Tower

The tendered rate shall include full compensation for all labour, materials, plant and equipment required for the supply and delivery, storage, mixing and placement of the proprietary repair compound, and finishing the surfaces after removing all projections resulting from access openings for the placement of the repair compound.

No payment shall be made for material not prepared and placed according to the Manufacturer's specification or for any excess mixed material or wastage.

New reinforcement shall be measured separately.

	Item	Unit
15.9	Formwork for cementitious grout as per Specification CSP8.	Square metre (m ²)

The unit of measurement is the square metre surface of formwork required for the grouting process.

The unit of measurement shall include full compensation for material, labour and plant to achieve a concrete surface equivalent or better than the surrounding concrete surface.

	Item	Unit
15.10	Curing of repair surfaces by means of self curing, cover with plastic sheeting or wet hessian etc.	Square metre (m ²)

The unit of measurement is the square metre of concrete repair surface treated or coated by the method of curing indicated and accepted by the Employer's Agent.

The unit of measurement shall include full compensation for all labour, materials, plant, equipment and safety measures required to cure the repair work to the satisfaction of the Employer's Agent.

	Item	Unit
15.11	Coating of repaired concrete with Sika Lastic-150 or similar to a thickness of 2mm.	Square metre (m ²)

The unit of measurement is the square metre of concrete coated.

The unit of measurement shall include full compensation for material, labour and plant to achieve a concrete surface equivalent or better than the surrounding concrete surface.

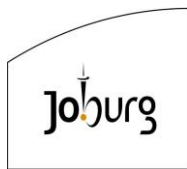
Employer:		Contractor:	
Witness:		Witness:	



SCHEDULE OF APPROVED MATERIALS FOR CONCRETE REPAIR

MATERIALS	PRODUCT	SUPPLIER
Anti corrosive steel rebar coating	Sika Mono Top 610	Sika
	ProStruct 688	ProStruct
	Concresive ZR	BASF
	Mapecar, Maperfer 1K	MAPEI
Bonding Primers	Sika Mono Top 610	Sika
	Not necessary	ProStruct
	Concresive 1414	BASF
	Eporip	MAPEI
Patch Repair Mortars	Sika Mono Top 615HB	Sika
	Prostruct 528VO MCI	ProStruct
	Emaco S73	BASF
	Mapecrout Rapide, Mapecrout T60	MAPEI
Skimming Mortars	Sika Mono Top 620	Sika
	ProStruct 526	ProStruct
	Emaco R303 Emaco R302	BASF
	Planitop 200, Planitop 540	MAPEI
Non-shrink Grout	ProStruct 531M	ProStruct
	Sika grout 212, Sikacrete 214	Sika
	Masterflo 524 Masterflo 525	BASF
	Mapecrout Hi-flow, Mapecrout SV, Mapecrout SVT	MAPEI

Employer:		Contractor:	
Witness:		Witness:	



**SPECIFICATION CWS: CEMENTIOUS WATERPROOFING OF CONCRETE
SURFACES**

CONTENTS

CLAUSE DESCRIPTION

CWS1	SCOPE
CWS2	SUPPORTING SPECIFICATIONS
CWS3	GENERAL
CWS4	CLEANING OF OVERALL CONCRETE SURFACES
CWS5	WATERPROOFING MATERIALS
CWS6	CONSTRUCTION: SURFACE PREPARATION
CWS7	CONSTRUCTION: PROTECTION AND CURING OF REPAIR MATERIAL
CWS8	CONSTRUCTION: PARTICULAR SPECIFICATION FOR REINFORCED WATERPROOFING SLURRY
CWS9	MEASUREMENT AND PAYMENT

Employer:		Contractor:	
Witness:		Witness:	



**SPECIFICATION CWS: CEMENTIOUS WATERPROOFING OF CONCRETE
SURFACES**

CWS1 SCOPE

This specification covers the requirements for the waterproofing over cracks in the concrete, walls, floors and roof.

CWS2 SUPPORTING SPECIFICATIONS

The following specifications shall, inter alia, form part of this specification:

- The project specification
- SANS 1200 Series
- The Manufacturer's Instructions

CWS3 GENERAL

3.1 Generally

The work described herein generally relates to the waterproofing of the cracks in the concrete walls and floors of the Reservoir and Water Tower. However similar principals apply to other waterproofing remedial work which may occur.

3.2 Work to be carried out by specialist

The work detailed in the Specification shall be carried out by any approval specialist, using artisans and staff skilled and experienced in waterproofing and waterproofing remedials and the use of the specialist waterproofing and coating materials and additives referred to hereunder.

3.3 Protection of finishes and existing structures

The Contractor shall provide adequate protection to all adjoining elements including sealants, equipment and fittings such that these are not damaged in any way during the aforementioned cleaning operations. During cleaning operations, all openings shall be adequately protected by the Contractor so as to prevent any ingress of abrasive or other cleaning material, e.g. grit, water, etc.

Any damage occurring or cleaning necessary as a result of inadequate protection and/or negligence by the Contractor shall be rectified by the Contractor at his own cost to the satisfaction of the Employer's Agent.

In the event that the Employer's Agent or his representatives deems the protection afforded to the works and surrounding elements and equipment to be inadequate the Employer's Agent reserves the right to decide that no waterproofing or coating work shall be undertaken.

Employer:		Contractor:	
Witness:		Witness:	



3.4 Rain and Wet Conditions

Adequate protection is to be provided by way of fixed setting to the manholes, etc. to provide a dry working environment for the application of all repair materials and coatings and such protection must be maintained at least until the initial set has taken place.

CWS4 PREPARATION OF OVERALL CONCRETE SURFACES

General

All exposed internal and external concrete shall be cleaned and prepared to achieve a contaminant free open textured concrete surface to the approval of the Employer's Agent. This must fully expose all defects including cracks, honeycombing, blowholes, day work joints, sealant rebates, etc. and remove all contaminants including moss, lichen, algae oil, grease, efflorescence, laitance, joint sealant residue, cementitious coatings, skims, renders, old repair material, etc.

4.2 Contractor to provide method statement

The Contractor shall include in his method statement his intended method of cleaning and preparation. However, such method statements will not limit in any way the Contractor's contractual obligations to meet the requirements of the proceeding and following sub-clauses and this Specification generally, to the entire satisfaction of the Employer's Agent or his representatives.

The Contractor shall satisfy the Employer's Agent prior to commencing with the works that his stated method of surface preparation is practical, economical and acceptable practise.

4.3 Cleaning of adjoining elements

All adjoining elements, equipment, fittings etc. shall be thoroughly cleaned of all cleaning materials and residue which remains resting upon or lodged in same on completion of the aforementioned concrete operations.

CWS5 WATERPROOFING MATERIAL AND COATINGS

5.1 Material to be that specified

All waterproofing materials and coatings used in the works shall be those as specified and precisely as detailed in this Specification and in the manufacturer's technical data sheets which form an integral part of this Specification.

The internal walls of the Reservoir shall be coated with a 3mm layer of Sikalastic 150 or similar with the cracks covered with reinforcing fabric to a final thickness of 4,5mm.

Employer:		Contractor:	
Witness:		Witness:	



5.2 Water requirement

Water used shall be clean potable water.

CWS6 CONSTRUCTION SURFACE PREPARATION

6.1 Surface cracks

Large cracks, wider than 2 mm, in the concrete surface are to be identified and cut out (chased), 6 mm wide, as directed by the Employer's Agent to remove loose concrete debris and other deleterious materials. The cracks shall be sealed with a polyurethane sealant 6 mm wide, care being taken that the depth does not exceed the width. Thereafter the crack shall be masked with masking tape to a width of 30 mm. Smaller cracks shall be wire brushed to remove all concrete debris and thereafter masked to a width of 20 mm.

All cracks internally shall be covered with an additional layer of fabric and Sikalastic 150, 120 mm wide to a thickness of 1,5mm, prior to the whole area being waterproofed.

CWS7 PROTECTION AND CURING OF REPAIR MATERIAL

7.1 General

During periods of hot weather and under conditions of drying winds, waterproofing material shall be placed as quickly as practicable and the Contractor shall take particular care to minimise the effects of such conditions so as to prevent drying to minimise shrinkage.

7.2 Contractor to specify means of protection

The contractor is to specify the means of protection he intends to use prior to commencement of the works and receive written approval thereof from the Employer's Agent.

7.3 Exposed faces to be protected from temperature changes

All exposed faces of placed waterproofing material shall be protected against rapid temperature changes and from drying out (from wind etc.) for a period of 2 days after the coating has taken its initial set.

All necessary precautions shall be taken to ensure that protective sheeting, etc. that may be used to comply with this clause does not impair the final surface of the protective coating so as to affect the finished performance or appearance.

Employer:		Contractor:	
Witness:		Witness:	



CWS8 PARTICULAR SPECIFICATION FOR REINFORCED WATERPROOFING SLURRY

All cracks shall be covered with a 120mm wide Sikalastic 150 reinforced fabric system internally only.

8.1 Existing concrete preparation

The existing parent concrete surface is to be thoroughly saturated with potable water, strictly in accordance with the manufacturer's specification before the waterproofing slurry is placed.

8.2 Mixing of coating

The additives are to be applied strictly in accordance with the manufacturer's specifications.

Sikalastic 150 or similar waterproofing slurry coating is to be mixed using the manufactures recommended mix proportions.

8.3 Application of coating

The surface to be waterproofed is to be saturated with clean potable water. Whist the surface is still wet apply a prime coat.

Pre-cut fabric into convenient sizes and soak in the slurry. Lay fabric in primed area and smooth to remove air bubbles. Once area is covered apply full coat of slurry over surface and allow to dry. Once dry apply a final coat.

Coverage to be minimum 2,5litres per m².

The fabric is to be lapped 50mm at edges and laps.

CWS9 MEASUREMENT AND PAYMENT

The pay items in this clause shall include full compensation for all work associated with the waterproofing of the concrete structural elements or portions thereof which are to already covered by the measurement and pay items of the Standard Specification or the Project Specification e.g. all procurement, transport, access and temporary works, plant and equipment required to undertake the work specified. General access and work platform and associated temporary works are covered in Specification ASR.

The quantities indicated in the Schedule of Quantities: are based on inspections performed as part of the preliminary and detail design phases. The actual work may result in significant variations as the work is executed which shall be considered in terms of the Special Conditions of Contract.

Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Existing Tower

Item	Unit
CWS9.1 Unreinforced waterproofing slurry (provisional) Internal	(m ²)

The unit of measurement is the square metre surface area waterproofing applied.

The tendered rate shall include full compensation for all labour, materials, equipment, etc. that is required for the supply, preparation and application of the slurry to the prepared concrete contract.

Item	Unit
CWS9.2 Reinforced waterproofing slurry for internal cracks	(m)

The unit of measurement is the metre length waterproofing applied.

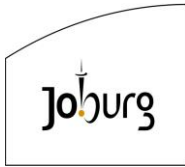
The tendered rate shall include full compensation for all labour, materials, equipment, etc. that is required for the supply, preparation and application of the prime slurry, fabric and all subsequent coats to the prepared concrete contract.

Item	Unit
CWS9.3 Preparation of cracks and waterproofing thereof	(m)

The unit of measurement is the linear metre of cracks to be prepared masked and waterproofed with a 120 mm wide fabric bandage system.

The tendered rate shall include full compensation for all labour, materials, equipment, etc. that is required for the supply, preparation and application of the prime slurry, fabric and all subsequent coats to the prepared concrete contract.

Employer:		Contractor:	
Witness:		Witness:	



SPECIFICATION RWS: REMEDIAL WATERPROOFING SEALANTS

CONTENTS

CLAUSE DESCRIPTION

RWS1	SCOPE
RWS2	SUPPORTING SPECIFICATIONS
RWS3	GENERAL
RWS4	MATERIALS
RWS5	APPLICATION OF SEALANTS

Employer:		Contractor:	
Witness:		Witness:	



SPECIFICATION RWS: REMEDIAL WATERPROOFING SEALANTS

RWS1 SCOPE

This specification covers the requirements for the remedial waterproofing sealants, sealing of junctions and joints.

RWS2 SUPPORTING SPECIFICATIONS

The following specifications shall, inter alia, form part of this specification:

- (a) SANS 1200.
- (b) The project specification
- (c) SANS 1077.
- (d) Manufacturer's data sheet of specific products specified in the specified approved product list and Schedule of Quantities.

RWS3 GENERAL

3.1 Generally

The work described herein generally relates to the remedial waterproofing sealants of the joints. The work includes, but is not limited to:

- (a) Sealing of junctions.
- (b) Sealing expansion joints in concrete.
- (c) Sealing of cracks.

3.2 Work to be carried out by Specialist

An approved Specialist using artisans, shall carry out the work detailed in the Specification and staff skilled and experienced in the use of sealant and coating materials and additives, referred to hereunder.

RWS4 MATERIALS

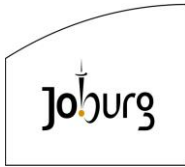
4.1 Sealant

Shall comply with the requirements of SANS 1077 for polyurethane sealant for external use.

4.2 Primers

Only primers approved by the Manufacturer of the sealant are to be used.

Employer:		Contractor:	
Witness:		Witness:	



4.3 Single pack polyurethane sealant

The following sealants are approved:

- ProStruct 642 Joint sealant.
- Sika Flex Pro 3i.

4.4 Backing Cord

Sondor “Polycord” foam backing cord

4.5 Hypalon Bandage or Polyolefin (FPO)

Hylam bandage from ProStruct or Combiflex from Sika.

4.6 Epoxy adhesives

ProStruct 795 or Sikadur 31CF.

RWS5 APPLICATION OF SEALANTS

5.1 Junctions and joints

Remove all failed sealants from the joints and junctions. All junctions and joints to be sealed must be carefully inspected. All traces of epoxy adhesive and cementitious coating shall be removed.

Any loose material, dust or foreign matter is to be removed to give the sealant a firm base to be bonded to. If the width of the junction exceeds 5mm a backing cord is to be installed prior to the application of the sealant.

The sealant is to be applied strictly in accordance with the manufacturer's instructions with particular reference to primers etc.

All internal cracks shall be V'd out and sealed with polysulphide sealant.

5.2 Floor/Wall joints

5.2.1 Joint Sealant Internal

A suitable rope and bond breaker such as Polycord having a dimension of 10mm shall be carefully inserted into the corner joints so that a snug fit is achieved.

The two prepared and cleaned vertical surfaces on which the polyurethane sealant must be adhered shall be primed with the approved primer. A continuous bead of polyurethane sealant, shall be applied into the joint over the Polycord. The thickness

Employer:		Contractor:	
Witness:		Witness:	



of the bead shall be 20mm and 20mm. The application shall comply with the manufacturer's recommendations and data sheets.

5.3 Hypolon or Polyolefin (FPO) bandage of Joints

All lap joints are to be hot air welded with a Leister hot air blower operating to thermostatically controlled temperatures between 400-500°C. The Contractor is to ensure that the membrane is neither scorched nor inadequately welded during this procedure.

The minimum side and end lap width for adhesion to the substrate is to be 100mm with a minimum seam width of 40mm for both laying procedures.

When mechanically fastening the membrane is to be fully bonded to all vertical or horizontal surfaces with the approved epoxy adhesive.

All seams are to be prepared and are to be clean, dry and free from grease or dust before welding. The inner faces of the seams are to be cleaned with the approved solvent based cleaners prior to welding.

The seam is to be tack welded prior to welding to ensure that a uniform seam is achieved. Seams are to be welded in two passes. During the first pass only the inner seam edge is to be welded to prevent hot air escaping during the actual welding pass.

During the final pass the seam must be rolled flat with an approved Silicon rubber pressure roller as the hot air is applied. The welding process is to be carried out by experienced operators who have passed the suppliers competence test requirements. The operator is to be issued with a certificate to this effect.

The contractor is to exercise care in the early morning when condensation or dew may occur on the surface of the waterproofing membrane or between the laps as wet or damp seams may create weld failures. These areas must be dried before welding.

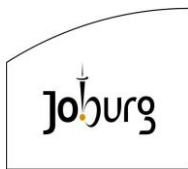
When low temperatures are experienced i.e. early mornings (± 10 degrees C), the seams are to be pre-warmed using a hot air blower.

The Contractor is to ensure to the Employer's Agents satisfaction that all welds are continuous and watertight. Pressure testing of all welded joints shall be done at completion of the work.

All seams, joint etc. are to be solvent wiped and particular attention should be made to the manufacturers' instructions in this regard. This applies to all types of Membrane application.

Joints and cracks on walls will be done with a 1mm thick system and 2mm on all floor crack and joints to a width of 150mm. The wall floor joint shall be done with a 300mm wide by 2mm thick membrane. Prior to construction the joint, insert a 100 x 100mm triangular closed all polyurethane fillet.

Employer:		Contractor:	
Witness:		Witness:	



TECHNICAL SPECIFICATION

CONSTRUCTION OF BULK CIVIL ENGINEERING SERVICES FOR THE FORESTHILL REPLACEMENT PIPEWORK

PROJECT DESCRIPTION

The purpose of this RFQ enquiry is to appoint a Specialist Corrosion Contractor to supply and install a requisite Cathodic Protection System. This system is intended to extend the useful life of the pipeline to be constructed within the boundary of the Reservoir Complex. This risk management effort is to ensure the continuous water supply to the communities as well as the longevity of this critical asset owned and operated by Johannesburg Water.

The pipeline construction is continuously welded pipes and specially fabricated sections. The steel sections will have to be protected from corrosion by implementing cathodic protection where required.

The mainline pipe coating is to be a fit for purpose product for additional protection from the elements in which this pipeline is to be constructed. The internal lining will be the standard JW Solvent Free Epoxy with a minimum 500-micron dry film thickness.

The following items will be included in the scope:

1. Insulating Flange Kits.
2. High Output Magnesium Sacrificial Anodes.
3. UPVC/Concrete Monitoring Posts.
4. Permanent Reference Electrodes.
5. Coating removal and repair at Sacrificial Anode Installation locations.
6. Exothermic/Stud Welding.
7. Cathodic Protection Cabling and Joint kits.

Employer:		Contractor:	
Witness:		Witness:	



CATHODIC PROTECTION CABLING

1. INTRODUCTION

The CP cable insulation should be based on the environmental requirements; therefore, the best insulating material for the application should be selected. The selection may involve the examination of various performance properties.

The choice of materials for cable design to satisfy any given combination of installation and environmental conditions can often be more critical than the electrical requirements.

These insulation materials can generally be split into thermoplastic and thermoset materials.

Thermoplastic materials soften and flow when heated and usually possess a definitive melting point. The material will become firm again upon cooling. These materials can be moulded and shaped with a heating and cooling process and the process can be repeated. Extrusion of melt flow polymers on wire is an example of this type of material.

Thermosets are soft and pliable during one stage of the processing, can be moulded and extruded at this state after which they are set or cured, usually at a higher temperature. After the setting or curing process (cross linking) is complete, they cannot be softened by reheating, hence the heat and solvent resistance properties are improved over thermoplastic materials.

2. GENERAL PROPERTIES OF INSULATING COMPOUNDS

The primary insulation material is the most important of the cable material for overall performance reasons. The following must be considered:

1. Voltage dielectric for higher voltage charge at the conductor surface.
2. Low loss material for high frequency signal cables.
3. Heat resistance in high temperature environments.
4. Low temperature flexibility.
5. Toughness for cut-through, abrasion and burial (crush) resistance.

Insulation compounds serve an electrical function first. Secondary properties consider the environmental factors. Environmental factors include, but are not limited to the following:

1. Fire resistance
2. Ultraviolet resistance (weatherability)
3. Chemical resistance

The some of the insulation compounds available include, but are also not limited to:

Polyvinyl Chloride (PVC)

Employer:		Contractor:	
Witness:		Witness:	



Polyolefins

Polyethylene (low (LMPE), medium (MMPE) and high density (HMWPE)) (PE)

Polypropylene

Cellular Polyolefins

Non-Halogen compounds

Fluorocarbons (PTFE, PVDF (Kynar), ECTFE (Halar), ETFE (Tefzel))

3 CABLE AND CABLE INSULATION COMPLIANCE

Cathodic Protection cables shall be insulated and rated for voltages up to 600V/1000V and shall possess stranded copper conductors in accordance with SABS 1507 or ASTM Specification B-8. The cable conductor and cable voltage drop shall be calculated in accordance with SABS 0142.

The insulated Cathodic Protection cables, PVC insulation Type S5 with UV Stabilisation.

The insulated Cathodic protection cables, HMWPE insulation Type I, Class C, Category 5 grades 8-5 shall comply with the requirements stipulated in ASTM D1248.

In exceptional corrosive environments, Fluorocarbon insulation shall be provided, as detailed by Johannesburg Water.

4. CATHODIC PROTECTION CABLE REQUIREMENTS

The following table shall be used when selecting dc Cables for Cathodic Protection. The insulation layers are specified from the inner layer (conductor surface) to the outer layer (environment).

Employer:		Contractor:	
Witness:		Witness:	



CATHODIC PROTECTION SINGLE CORE CABLE REQUIREMENTS

CABLE DETAIL	INSTALLATION ENVIRONMENT	INSULATION LAYERS AND TYPE	INSULATION COLOUR
Positive DC	Direct Sun	PVC/HMWPE	Red
	Partial Sunlight	PVC/PVC	Red
	Soil (Non-Polluted)	PVC/PVC	Red
	Soil (Polluted)	PVC/HMWPE/PVDF	Red
Negative DC	Direct Sun	PVC/HMWPE	Black
	Partial Sunlight	PVC/PVC	Black
	Soil (Non-Polluted)	PVC/PVC	Black
	Soil (Polluted)	PVC/HMWPE/PVDF	Black
AC Mitigation Grounding	Soil (non-polluted)	PVC/PVC	Green-Yellow
	Soil (Polluted)	PVC/HMWPE/PVDF	Green-Yellow
Sacrificial Anodes	Soil (non-polluted)	PVC/PVC	Red / Blue
	Soil (Polluted)	PVC/HMWPE/PVDF	Red / Blue
Pipe Monitor	Soil (Non-Polluted)	PVC/PVC	Black
	Soil (Polluted)	PVC/HMWPE/PVDF	Black
Reference Electrode	Soil (Non-Polluted)	PVC/PVC	Red
	Soil (Polluted)	PVC/HMWPE/PVDF	Red
Corrosion Coupons	Soil (Non-Polluted)	PVC/PVC	Black
	Soil (Polluted)	PVC/HMWPE/PVDF	Black

In certain instances, where CP installations are conducted outside Johannesburg Water Plant battery limits, multi-core power cabling is required, such as:

Positive DC Header Cable - 4 Core x mm² PVC/PVC/SWA/PVC

AC Feeder Cable - 4 Core x mm² PVC/PVC/SWA/PVC

5. CABLE INSTALLATION AND IDENTIFICATION

Johannesburg Water shall specify the cable burial depth and the cable warning tape burial depth from project to project. Furthermore, Negative cables to pipe and positive cables to the anode groundbed may require additional protection against vandalism i.e., Concrete poured.

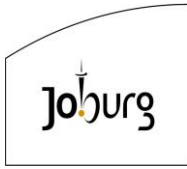
6. EXOTHERMIC / STUD WELDING CABLE CONNECTION DETAILS

6.1 CABLE CONNECTIONS TO PIPES AND REPAIR TO COATINGS

Unless otherwise specified all cable connections to the pipe are to be by means of thermit (exothermic) welding. This applies equally to the negative cable from the Rectifier, continuity and cross Bonding Cables, Test Post cables, DC Decoupling device cables, etc.

Exothermic welding is not permitted if anyone of the following conditions is present:

Employer:		Contractor:	
Witness:		Witness:	



Volume 1 Tender and Contract
Section C4 Particular Project Specifications: Pipe Replacement

The pipeline wall thickness is less than 3.0mm or severe corrosion has occurred and the wall thickness unknown.

The pipeline is lined internally and contains no product or is partially filled with product.
Live gas distribution/transmission pipelines.

In these instances, cables shall be connected by means of Pin Brazing.

Refer to Volume 4 – Methodology & Precautions of Exothermic / Stud welding of cable connections to steel pipelines / structures”.

6.2 REINSTATEMENT OF THE COATING SYSTEM

The pipeline coating shall be reinstated in accordance with or to the satisfaction of Johannesburg Water.

Employer:		Contractor:	
Witness:		Witness:	



7. PERMANENT REFERENCE ELECTRODES

7.1 GENERAL CONSIDERATIONS

Reference electrodes must be suitably designed to allow for uninterrupted and continuous use for a 15-year period.

Client approved IR Free permanent burial type electrodes with monitor coupons shall be used, complete with the approved PC Board. The shunt shall be rated at 20W and 0.1Ω as a minimum and a Reed Switch shall be used to interrupt the coupon during testing. Push button and toggle switches are not permissible.

The reference electrode above is of the saturated copper/copper sulphate gel type.

The coupon shall be manufactured from similar material as the pipeline and shall possess a surface area not exceeding 2cm². The coupon surface shall be cleaned to St2 (oil, grease, rust and other contaminants).

The reference electrode shall be installed in the same backfill material as the pipeline, between the 3 and 9 O'clock position furthest from the groundbed and not more than 20cm from the pipe. The Contractor shall ensure that the reference electrode is not damaged during installation, surrounded by stones (>5mm diameter in size), plastic and/or air pockets.

Full details and technical data sheets must be supplied by the contractor with their bid.

7.2 MANUFACTURER QUALIFICATIONS

Electrode manufacturer should have an acceptable track record with sufficient information regarding the reference electrodes supplied and the quality thereof and the successful duration of their installation. Approval must be obtained in writing from the JW Corrosion Engineer before a product may be used on site.

7.3 PERMANENT REFERENCE ELECTRODE CONSTRUCTION

The permanent burial type shall consist of an encapsulated ceramic tube with yellow protective end caps.

The ceramic tube shall have a surface sensing area of at least 175 cm². Should the contractor propose alternative surface areas the final decision to accept the reference electrode will rest with Johannesburg Water. It is the Contractor's responsibility to provide sufficient information for Johannesburg Water to make an educated decision.

Electrodes shall have a minimum life of 15 years and shall incorporate a solid state porous ceramic material complete with a Chloride Ion entrapment feature.

Employer:		Contractor:	
Witness:		Witness:	



7.4 PERMANENT REFERENCE ELECTRODE STABILITY

Stability to be <10 milli-volts with 3 micro-amp load.

Temperature Range: 0°C to 57.2°C (+32°F to +135°F)

7.5 GENERAL MAINTENANCE OF PORTABLE REFERENCE

Storage, plastic cover with view glass, etc.

8.0 CATHODIC PROTECTION TEST POINTS

8.1 INTRODUCTION

Two types of test posts are currently in use i.e., one is a Potential Test Post used only for monitoring the pipe potential and the other is a Bonding Test Post which has a cable coming into it from the pipeline to be protected as well as from other sources e.g., sacrificial anodes, another pipe, etc.

As the test posts are to stand out in the open and may be subjected to vandalism or to stresses caused by contact with animals, the mechanical construction is of great importance.

8.2 LOCATIONS

Test posts / stations for potential monitoring and for the operation of the CP system shall be installed at the following locations:

At all pipeline crossings (Client and foreign) which are cathodically protected and major pipeline (greater than 200mm Outer Diameter) crossings which are not cathodically protected.

At all galvanic sacrificial anode locations, unless otherwise specified by Johannesburg Water:

At all cased, directional drilled and / or pipe jacked crossings.

On either side of all electrified railway lines.

On either side of all DC traction affected non-electrified railway lines.

On either side of all national, provincial and major roads. On one side of all frequently used (greater than 50 vehicles per day) roads and / or heavy haul sand / dirt roads.

At intermediate locations on long piping runs (maximum separation 1 km). Care shall be exercised to ensure that they are suitably located to facilitate routine cathodic protection monitoring.

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Witness:		Witness:	



In severe DC traction stray current environments, all TPs shall include “IR” free monitoring facilities and permanent “IR” free reference electrodes every 1 km (maximum separation between any two TPs).

At AC mitigation earthing stations.

At all underground pipeline isolators to permit testing of live and dead sides and current measuring facilities during temporary cross bonding.

On both sides of a major water crossing. A major crossing shall constitute any river where water flows for at least 6 months of the year on a continuous basis and the river crossing exceeds 3 m in length.

On both sides of a waterway (navigable crossing).

On both sides of a major vlei, marsh and / or wetland (pipeline traverses nominally > 500 m through the “obstacle” during the wet season). If the crossing is shorter, one TP may be permitted upon approval from Johannesburg Water.

In reservoir areas to monitor the efficacy of the CP system. Care shall be exercised relating to hazardous area classification and avoiding obstruction relating to normal plant operations.

The test point shall be selected based on several considerations, such as:

Risk of vandalism, theft and / or general damage.

Access relating to operation, maintenance and monitoring.

Possible damage by agricultural vehicles, plant vehicles, etc.

MONITORING TEST POSTS

Monitoring Test Posts are to be constructed of a combination of a 30cm OD UPVC Pipe, 1.5m long, and the internal section/cavity is to be filled with 50 MPa concrete. The concrete is to be poured/filled up until 150mm from the top of the test post.

They will contain an integral mounted brass terminal point, which will be connected internally into the concrete. The terminal points are to be constructed of brass, 20mm in diameter connected to a 16mm² PVC/PVC (double insulated) copper cable to be used as the monitor cable. The cable is to be connected to the pipe by stud welding. The brass connection points are to have a 4mm diameter hole to accept a male adaption banana plug. The female banana jacks are to be clearly marked “PIPE” and “Reference Electrode” on a stencilled backing plate firmly secured to the concrete protrusion within the testing facility.

The test post is to be equipped with a Permanent Copper/Saturated Copper Sulphate Reference Electrode (PRE).

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A suitable cover is to be fitted to the top of the UPVC test post that will slot into the opening of the top of the test post. The test post cover/lid will be adequately designed to be both waterproof and vandal proof as possible.

The Test Post should be nominally 1.5m in length with approximately the bottom 0.5m concreted into the ground. The cross section should be minimum 130mmx130mm square and steel reinforced rebar.

10 INSULATING FLANGE (IF) MATERIAL GENERAL CONSIDERATIONS

10.1 GENERAL CONSIDERATIONS

Pipeline electrical Insulating Flange (IF) materials shall be selected with consideration given to quality and standard material availability. The chosen material shall be able to withstand the maximum line temperature, pressure and predicted line movement. All IF materials shall be cross referenced to the manufacturers specifications to ensure compatibility between materials, service and the environment.

The materials required per IF, shall be supplied as one complete set. The latter shall consist of an insulating non-metallic central gasket, non-metallic bolt sleeves and non-metallic washers and steel thrust washers, as well as the associated high tensile steel studs, nut and bolts.

11.1 MATERIAL SPECIFICATIONS

The non-metallic central gasket and non-metallic washers shall conform to the following materials specification.

Material Property	ASTM Test Method	SI Value	Imperial Value
Dielectric Strength (Min.)	D149	21 kV/mm	540V/mil
Compressive Strength (Min.)	D625	340 MPA	49,000 psi
Water Absorption (Max)	D229	0.1%	0.1%
Operating Temp (Min)		-17°C	0°F
Operating Temp (Max)		+93°C	200°F
Hardness, Rockwell M (Min)	D785	115	115
Shear Strength (Min)	D732	150 MPA	22,000 psi

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Steel thrust washers shall be machined with diameter and thickness to SABS 1149 Table № 3 or to ASTM A325-61T. Thrust washers shall have machined, parallel faces.

Insulating sleeves shall be a minimum 0.8mm thick glass fibre reinforced polyester, Mylar or Nomex sleeve for each bolt. Total length of each sleeve is to be 2-3mm longer than the length between outside faces of the steel washers. The insulating sleeves shall fit completely inside the insulating washers and extend partially inside the steel washers.

Insulating washers shall be manufactured from 3,2mm thick fabric reinforced phenolic resin with the outer diameter (O.D.) being the same as that, of machined steel washer. Two off for each stud bolt. The inner diameter of the insulating washer shall be a sliding fit over the O.D. of insulating sleeves.

Stud bolts and studs shall be grade 8.8 and nuts grade 8 to SABS 136. Stud bolt diameters shall be selected to the next smaller size for installation in standard drilled flanges. Stud bodies shall be machined down to the next standard smaller size and a smaller nut is also to be used.

A SS-DCD Decoupling device or technically compliant equivalent shall be installed across the flange faces complete with hot-dip galvanising mild steel mounting brackets to suit the flange bolt. The DC Decoupling device shall be in a suitably rated enclosure as stipulated in SABS/IEC 79 and SABS 0108.

The entire insulating flange shall be wrapped circumferentially with a 15 to 20mm thick white plastic backed polymer modified bituminous tape, or similar approved. The latter shall have a minimum overlap of 25mm. In the case of surface irregularities, i.e., stepped flanges, etc. A CLIENT approved Petrolatum mastic material shall be used to provide a smooth contour for subsequent tape application.

10.1 IDENTIFICATION / LABELS

"OPERATING INSULATING FLANGE"

"NO ATTACHMENTS TO PIPEWORK PERMITTED"

A 25mm wide plastic backed electrical tape to SABS 122 - 1975 colour red shall be applied in the centre on the horizontal surface.

A 2mm thick aluminium plate, 80 x 80mm shall be engraved as detailed above. The characters shall be 20mm high and filled with black indelible ink.

The aluminium plate shall be fixed to the insulating flange with stainless steel strapping.

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11 HIGH POTENTIAL SACRIFICIAL MAGNESIUM ANODES (SOIL USE)

11.1 GENERAL CONSIDERATIONS

The performance characteristics of the 1,75V high potential magnesium alloy, is detailed below. The high potential alloy is specially formulated from pure virgin magnesium and other elements to produce the higher voltage. The advantages of the high potential anode versus its 1,55 V counterpart, is as follows:

- The higher driving potential permits fewer anodes in this specific application.
- The capacity of a high potential anode is some 4 % greater than that of the other anodes, improving the overall life of the anode.
- The material will be produced from virgin magnesium and shall contain no scrap, thus ensuring points (a) and (b) above.

The anodes shall be manufactured in accordance with ISO 9002. The contractor shall submit written confirmation from the relevant standards authority, confirming complete registration in this regard.

11.2 MAGNESIUM ANODE CHEMICAL COMPOSITION

The high potential magnesium anode shall conform to the following chemical composition:

ELEMENT	PERCENTAGE (%)
Aluminium (Al)	0,001 Maximum
Zinc (Zn)	N / A
Silicon (Si)	N / A
Manganese (Mn)	0,50 to 1,30
Nickel (Ni)	0,001 Maximum
Iron (Fe)	0,03 Maximum
Copper (Cu)	0,02 Maximum
Other	N / A
Total of all Other Impurities	N / A
Magnesium	Balance

The anode capacity shall be a minimum of 1200 A.hr/kg.

11.3 HIGH POTENTIAL MAGNESIUM ANODE PHYSICAL PROPERTIES

The high potential magnesium alloy anode shall have a net minimum weight of 10kg and a minimum length of 533mm and nominal diameter of 114mm, when unpacked. The unpacked and packed dimensions are detailed in Standard Drawing.

The anode shall be free of blow holes, cold laps, porosity seams and any other imperfection which may impair its performance. Extruded anodes shall be used and cast anodes may be used if approved by Johannesburg Water.

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A 5mm diameter pre-galvanised steel threaded stud or rod shall be centrally located within the anode. The latter shall extend for at least 95% of the anode length and shall be extruded or cast into it. The pre-galvanised threaded steel stud or rod shall be suitable for the electrical connection of the anode-to-anode cable, which shall terminate in a recess at the one end. The connection shall be suitable for 20 years under submerged conditions.

11.4 ANODE CABLE AND CABLE CONNECTION

The anode cable shall be as specified in Section 14 of this Specification and the length shall be 6m or as specified in the RFQ document and detailed in the typical drawing shown in "Volume 5 – Typical drawings".

In all instances a suitable hole will be drilled into the end of the thread or rod and the cable shall be brazed / soldered into the hole.

The insulation of the cable shall be removed for a length such that at least 25mm of the copper is inserted into the drilled galvanised steel rod hole.

The cable shall then be brazed / soldered into the hole. At least 25mm of insulation shall extend into the anode recess.

Mechanical connections between the anode cable and the pre-galvanised steel rod or thread shall not be permitted under any circumstances.

The anode recess shall be completely flooded with hydrochloric acid (10% solution) resistant epoxy. All proposed epoxies shall be submitted to Johannesburg Water for review, prior to their use. The epoxy shall completely fill the recess without spilling over onto the external surface of the anode.

No bare copper cable shall extend outside the epoxy; the insulation shall extend at least 25 mm into the epoxy as stipulated above.

The maximum cable to anode resistance shall be 10 mΩ. The cable shall be pulled or tugged initially as a test after making the cable to anode connection.

11.5 ELECTROCHEMICAL PROPERTIES

The solution potential of the anode when fully submerged in the test chamber, shall be more negative than -1,65 V with respect to a saturated copper / copper sulphate reference electrode.

The anode shall maintain this potential at a 100-mA output and shall possess a capacity of 1200 A.hrs/kg.

11.6 TESTING AND REVIEW

A complete set of both chemical and metallurgical tests shall be conducted on a few randomly selected anodes, as determined in accordance with BS 6001, Part 1, prior to

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installation of the anodes. All these costs shall be borne by the supplier/installation contractor. Anodes may only be installed after testing and review from Johannesburg Water.

Complete chemical and metallurgical compliance shall be ensured prior to their installation and a detailed report shall be submitted to Johannesburg Water for review. Testing shall be carried out at the contractor's expense.

The natural anode potential and current drawn shall be measured prior to permanently connecting the anode to the pipe / structure. This data shall be submitted with the commissioning report.

11.7 TYPICAL INSTALLATION DETAILS

All anodes shall be installed at a minimum depth of 2,5m or pipe invert depth, whichever is the deeper. The anodes shall be located a minimum of 3,5m from the pipe or as determined by the CP Design. The anode / pipe separation distance shall be stipulated in the bill of quantities of the RFQ document.

The distribution of the anodes shall also be stipulated in the bill of quantities of the RFQ document.

The anodes shall be in a cotton bag which shall ensure that a minimum of 35 mm of crushed natural granular gypsum / bentonite / anhydrous sodium sulphate in the ratio by volume of 75% / 20% / 5% respectively, surrounds the entire anode surface.

The anodes shall be completely submerged for 2 hours prior to installation and the entire anode excavation (hole) into which they are to be placed shall be thoroughly soaked prior to backfilling. Care shall be exercised when backfilling to prevent damage to the anode cable.

The cable connection, installation and backfilling / reinstatement shall be witnessed by Johannesburg Water.

12.0 AC Mitigation

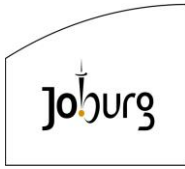
Gradient Control Mats (GCM)

The following installations are required.

12.1 The gradient control mat (GCM) is to be made of 4mm X 100mm X 100mm weld mesh. The mat is to be Hot Dip galvanized to SANS 121-2000.

12.2 The GCM is to be installed around the outside of the valve chambers at a depth of 0.5m in a 1.2m wide border. This mesh is to be covered with 200mm of 20 MPa concrete. The same type of grid is to be installed above the existing chamber floors. Four off 1.2m long 14.5Kg Magnesium Anodes are to be installed horizontally 300mm

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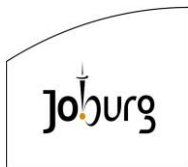
below the grid and connected to the grid by means of 16mm² double insulated PVC/PVC cable. The cables are to be thermit weld.

- 12.3 The separate components (the external and internal mats) of the GCM are to be connected to the pipeline via a suitable link panel which is to be installed inside the valve chamber. Each connection is to compromise twin parallel black 35mm² PVC/PVC insulated copper cables.

In the event of the external part of the GCM being made up of sections, the sections are to be inter-connected by means of twin parallel 6mm² PVC insulated copper cables.

- 12.4 The cables to the GCM connections are to be completely sealed using epoxy filled cable splicing kits.

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Johannesburg Water (SOC) Ltd



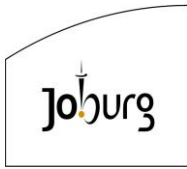
CONTRACT NO: JW14402

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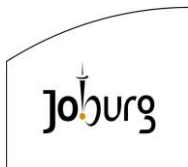


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C4 SITE INFORMATION

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

C4.2.1 The works is located in Turffontein, South of Johannesburg, at 418 Rifle Range Road on Erf 68, Turffontein. The site is situated in a built-up area and cooperation with the local community is off the essence during the construction period.

There is an old 1,1ML water tower and pump station on the site. The purpose of this project is to enhance the current water storage capacity for the high level areas around the reservoir.

The centre point coordinates of the reservoir are given in the following table:

Description	Y	X
Centre point of new Tower	95 574.627	+2 905 879.650

C4.2.2 COMMUNICATIONS TOWER

There is a communication tower on the site. The Contractor must take the position of the Comms Tower in consideration when putting up a tower crane for the construction of the Elevated Tower.

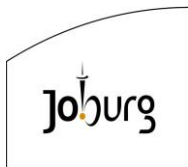
C4.2.3 DIRECTIONS TO THE SITE

The best route to the site is to follow the N12 national road and to take the Kliprivier Drive off-ramp. Drive in a northern direction towards Johannesburg CBD. Turn onto the M38 (Rifle Range Road) in an eastern direction. The site is on the right-hand side at 418 Rifle Range Road, about 1,3km from Kliprivier Drive.

C4.3 SITE BOUNDARIES

The site is fenced with a concrete palisade fence and is divided into two sections, one with the existing facilities on and the other an old dwelling, currently occupied by a tenant. Both sections are the property of Johannesburg Municipality. There is also a communication tower on the site which must remain functional during the construction period.

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C4.4 ACCESS TO SITE AND RESTRICTIONS

Any permission as may become necessary shall be the responsibility of the Contractor to obtain.

The site is directly adjacent to the M38 route. This route carries extremely high traffic volumes and special measures is required to accommodate the traffic.

C4.5 EXISTING SERVICES, SERVITUDES AND WAYLEAVES

The existing treatment works must remain in operation during the execution of the contract. The Employer must have access to the works at all times. If the work to be done requires the treatment works to be out of operation for a short period, prior arrangements must be made at least one week in advance with the Employer's Agent.

The positions of known services cannot be guaranteed. On establishing on Site, the Contractor must determine the positions of all existing services in the various areas of work. The Contractor must take precautions to prevent any damage to existing services and infrastructure. Damages which might occur will be repaired at the cost of the Contractor.

It is envisaged that no permits or wayleaves will be required.

For detailed specification the Contractor shall refer to clauses PS 1.5 (Temporary Works), PS 4.4 (Existing services), and PS 4.8 (Permits and wayleaves), Part 3: Scope of Work.

C4.6 POSSESSION OF SITE

Upon written instruction from the Employer's Agent, the Contractor will take possession of the site during a site handover meeting. The Contractor must take note that maintenance teams of Joburg Water as well as communication companies will visit the site regularly for routine and emergency maintenance on the existing facilities

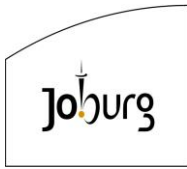
C4.7 ACCOMODATION ON SITE

There is no accommodation available on the site, and the Contractor will make his own arrangements elsewhere for the accommodation of his workers and sub-contractor labourers. Only security personnel will be allowed during non-working hours on the site. The Contractor will make own allowance for the provision of adequate ablution facilities during the construction period.

C4.8 NATURE OF GROUND AND SUBSOIL CONDITIONS

Working space on the site is very limited and the lowest point on the site is about 11m below the existing tower. The Contractor will have to import filling material to build a platform and retaining wall in the southern corner of the stand to create an area for his site camp. It might be

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necessary for the Contractor to find a nearby empty stand to serve as storage area for materials and equipment.

C4.9 SERVICES ON SITE

The contractor will apply to the Local Municipality for water and electricity connections required and he will be solely responsible to pay such fees as charged by the Municipality for consumption used during the construction period.

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